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# SUPPLEMENTARY NOTES ON SALVIA: AUDIBERTIA[1]

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At the time I described and illustrated *Salvia Brandegei* (Ann. Mo. Bot. Gard. **25**: 117, *pl. 20.* 1938) I had not seen it in flower, my visit to Santa Rosa Island having been made with the object of securing seeds. The drawing therefore was made from pressed material of which, at that time, there were not many collections. The stamens of all the plants examined were included in the tube and the style was exserted as shown in the plate referred to. Several transplants were brought back, however, and grown at the Blaksley Botanic Garden at Santa Barbara through the courtesy of Mr. M. van Rensselaer. Upon examination of these plants in flower, seven in all, it was found that, although some had the structure which was illustrated in the above-mentioned plate, others had exserted stamens but included styles, as shown in plate 29, herewith presented. This drawing was made by me from living material and put in wash by Mr. S. de Hospodar of the Works Progress Administration. Amongst the seven transplants mentioned above either one type or the other is found to be constant on a given individual. Mr. Wm. Hovanitz, who recently visited the island, kindly examined the living plants there and found the same to be true of them. In so far as I am aware, this is the only American *Salvia* in which this differentiation of floral structure is to be found.

[1] Issued September 25, 1940.

**10a. Salvia (Audibertia: Jepsonia) chionopeplica,** sp. nov. Pl. 29, figs. 3 and 4.

Frutex pilis ramosis densis utrimque floccoso-niveus; foliorum laminis ovatis vel oblongis 1.5–2 cm. longis, 7–12 mm. latis, in apice rotundatis, in basi ad petiolos 5–10 mm. longos angustatis, marginibus crenulatis, pagina superiore bullulata, inferiore reticulato-venosa, ambabus niveis; floribus in glomerulis densis globosis floccoso-niveis modo solitariis modo duobus, bracteis subfoliosis integris obtusis subtentis; calycibus florentibus 9–10 mm. longis, in maturitate 12–13 mm. longis ore obliquo dentibus duobus inferioribus ad superiorem adjunctis; corollarum caerulearum tubo 13 mm. longo ad medium intus dense piloso-annulato, labia superiore 4 mm. alta, inferioris paulo longioris lacinia media plana obcuneata ut videtur deflexa; staminibus valde exsertis, ut videtur arcuatis; stylo ut videtur deflexo.

MEXICO: BAJA CALIFORNIA. 36 mi. east of Rosario, 12. IV. 1931, *I. L. Wiggins 5300* (Stanford Univ., TYPE).

This most interesting plant is the ninth species of *Audibertia* to be found in northern Lower California and the only one endemic to that region. In habit of foliage and inflorescence it is similar to *S. Clevelandii.* The leaves are more bullate, however, and snowy with a dense branched pubescence. Such pubescence is otherwise characteristic in *Audibertia* only of *S. leucophylla.* The bracts and flowers are nearly those of *S. leucophylla,* but blue rather than rose color. According to the collector, they were "clear lavender with red spots." The orifice of the calyx, like that of *S. leucophylla,* is nearly entire. Although the two lower teeth are still perceptible, they are wholly joined to the upper. In *S. leucophylla,* they are obsolete or nearly so. The conformation of the corolla is similar to that species, but the stamens appear to be arcuate, rather than thrust out and the style is apparently declined. The species occurs in the *Larrea-Franseria* formation. The wash drawing was made by Mr. H. Harthende of the Works Progress Administration.

**Salvia Munzii × apiana.**—*Salvia Munzii* occurs in an almost pure stand near the upper Otay Dam in San Diego Co., Calif.,

covering the slope for many acres. Along the slope at its southern border it comes into contact with *S. apiana*. Along this interface two hybrid plants were recently found by Mr. Harlan Lewis. Like those from Lower California, these hybrids closely resemble *S. Munziana* in vegetative habit and in inflorescence, but have larger leaves and are whiter. The flowers, however, are about intermediate and the hybrid may readily be distinguished from *S. Munzii* by the marked exsertion of the stamens. A traverse of a mile was recently made through an area on San Antonio Mesa, Lower California, where these two species occur together, and of about 3,000 plants of both species only one was found to be of hybrid origin. This will give an approximate notion of the infrequency of the hybrid, when both species occur abundantly together.

Pollen smears were made from both parent species and the hybrid found at Otay Dam. These showed 16 pairs of chromosomes for both species. Stewart (Am. Jour. Bot. **26**: 731. 1939) has reported 15 for *S. Munzii*. However, his count was made from root-tip material, and, because of the small size of the chromosomes of *Salvia*, it is difficult to obtain accurate counts from somatic material. Nevertheless, it is possible that his count was correct for the material which he examined. The hybrid also had 16 pairs, but there were a number of chromosome aberrations, chiefly chromosome bridges with accompanying fragmentation. This suggests that there may have been one or more inversions. Pollen fertility in the hybrid was about 60–75 per cent, compared to 95–100 per cent in both species. The strong secondary association of at least 4 chromosomes in *Salvia apiana* suggests that this species may be a polyploid.

The hybrids of *S. apiana* × *mellifera* and *S. apiana* × *Munzii* are readily distinguishable; the former is usually more like *S. apiana*, particularly in the inflorescence. The differences in flower color and the occurrence of albinos suggest that the inheritance of this character in the two species is due to different factors.

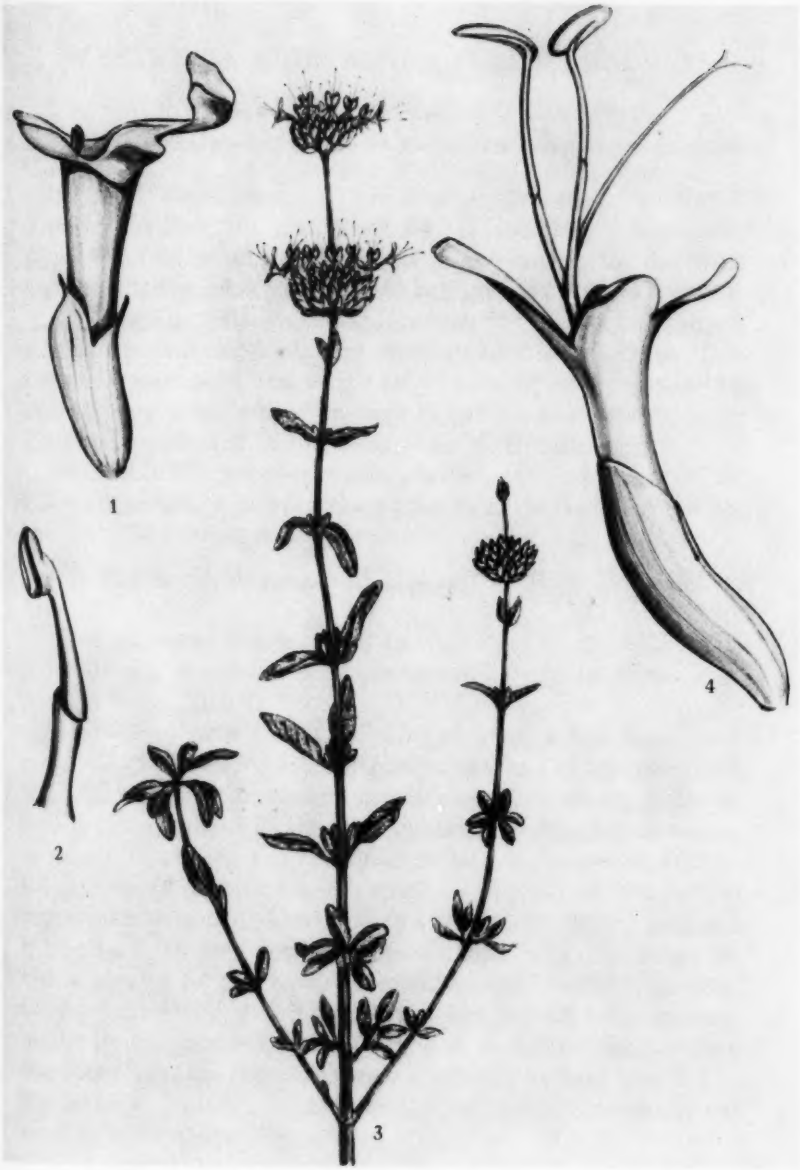
The author is indebted to Dr. Thomas W. Whitaker for the data contained in paragraph two.

## Explanation of Plate

### PLATE 29

Figs. 1 and 2. *Salvia Brandegei* drawn from life (flower × 5, stamen × 10).

Figs. 3 and 4. *Salvia chionopeplica* (habit sketch one-half natural size, flower drawn from a boiled specimen, × 5).




EPLING — SALVIA: AUDIBERTIA

# MERTENSIA DRUMMONDII (LEHM.) G. DON[1]

LOUIS O. WILLIAMS

*Research Associate, Botanical Museum of Harvard University, Cambridge, Mass.*

In my "Monograph of the Genus *Mertensia* in North America" (Ann. Mo. Bot. Gard. **24**: 17–159. 1937) *Mertensia Drummondii* (Lehm.) G. Don was placed among the doubtful and excluded species, the type not being known. Since then Dr. A. E. Porsild, of the National Museum of Canada, has loaned me two specimens which seem undoubtedly to belong to *Mertensia Drummondii* and which help to clarify that species. In addition a specimen cited on page 113 of the monograph under *Mertensia viridis* A. Nels., belongs to *M. Drummondii*.

*Mertensia Drummondii* should be inserted on page 117 of the monograph, following the varieties of *M. viridis*. An account of the species is as follows:

**19f. Mertensia Drummondii** (Lehm.) G. Don, Gen. Hist. **4**: 319. 1838. Pl. 30.

*Lithospermum Drummondii* Lehm., Pug. **2**: 26. 1828.

*Mertensia sibirica* var. *Drummondii* Gray in Proc. Am. Acad. **10**: 53. 1875.

Stems erect or ascending, 7–15 cm. long, 1–few from each rootstalk; basal leaves elliptic (only one seen), acute, petiolate, blade 20 mm. long and 5 mm. broad, strigillose above, glabrous below, petiole about as long as the blade; cauline leaves sessile or nearly so, elliptic to broadly lanceolate, acute or obtuse, 1.5–3.5 cm. long, 5–10 mm. broad, strigillose above, glabrous below; inflorescence crowded, a modified scorpioid cyme; pedicels glabrous, 1–10 mm. long; calyx 4–8 mm. long, the lobes divided almost to the base, lanceolate, acute, ciliate; corolla-tube 4–7 mm. long, glabrous within; corolla-limb 4–7 mm. long, moderately expanded, about as long as or a little shorter than the tube; fornices inconspicuous, glabrous; anthers about 1.5–2 mm. long; filaments as long as the anthers; style usually exceeding the corolla-tube.

[1] Issued September 25, 1940.

Distribution: known definitely only from the Northwest Territories in the vicinity of Coronation Gulf.

NORTHWEST TERRITORIES: "Camp Necessity," Clifton Point, west end of Dolphin and Union Strait, 1916, *Girling 687* (Nat. Mus. Canada); Wollaston Land, Lat. 69–70° N., Long. 115° W., Aug. 11, 1915, *Jenness 410* (Nat. Mus. Canada).

WITHOUT LOCALITY: a specimen marked "ex herb. Hooker, *Lithospermum Drummondii*, Fl. Bor.-Am.," and "Nov. 1874. I say it is *M. sibirica* Don var. *Drummondii*. Large-flowered form. A. Gr[ay]." (New York Botanical Garden).

A curious species which is most closely allied to *Mertensia viridis* A. Nels. It seems to be an outlying species of a group of which the center of distribution is in Colorado. The closest station of an allied species of *M. Drummondii* is more than 1500 miles to the south.

## EXPLANATION OF PLATE

### PLATE 30

*Mertensia Drummondii*. Habit sketch × 1⅓; flower parts × 3⅓.


WILLIAMS—MERTENSIA DRUMMONDII

# CONTRIBUTIONS TOWARD A FLORA OF PANAMA[1]

## IV. Miscellaneous Collections, chiefly by Paul H. Allen

ROBERT E. WOODSON, JR.
*Assistant Curator of the Herbarium, Missouri Botanical Garden*
*Assistant Professor in the Henry Shaw School of Botany of Washington University*
AND ROBERT W. SCHERY
*Assistant in the Henry Shaw School of Botany of Washington University*

### MARSILEACEAE
*(W. R. Maxon, Washington)*

Marsilea polycarpa H. & G.—panamá: vicinity of Bejuco, June 18, 1939, *A. H. G. Alston & P. H. Allen 1867*. New to Panama, but widely dispersed in tropical America.

### POLYPODIACEAE
*(W. R. Maxon, Washington)*

Alsophila villosa (H. & B.) Desv.—chiriquí: trail from San Felix to Cerro Flor, alt. 100–850 m., Aug. 13–14, 1939, *P. H. Allen 1940*. New to North America, agreeing closely with typical material from Caracas. Range in South America: Colombia, Venezuela, the Guianas, and Brazil.

Anemia millefolia Gardn.—coclé: vicinity of El Valle, Dec. 8, 1938, *P. H. Allen 1166*. New to North America. Previously known from Brazil and Colombia.

Cyathea conspersa Christ—chiriquí: vicinity of Cerro Punta, Jan. 21–24, 1939, *P. H. Allen 1522*. New to Panama. Known otherwise only from Costa Rica, where it is fairly common.

Dicranopteris mellifera (Christ) Underw.—coclé: north rim of El Valle, July 9, 1939, *P. H. Allen 1893*. A monstrous form. New to Panama, having been known only from Costa Rica.

Diplazium Sanctae-Rosae Christ—chiriquí: trail from Cerro Punta to headwaters of Río Caldera, alt. 2250–2500 m.,

[1] Issued September 25, 1940.

Jan. 14, 1939, *P. H. Allen 1447*. New to Panama. Known only from Costa Rica previously.

DRYOPTERIS SCALARIS (Christ) C. Chr.—COCLÉ: vicinity of El Valle, alt. 600–1000 m., Dec. 8, 1938, *P. H. Allen 1163*; PANAMÁ: hills above Campana, alt. 600–800 m., Dec. 23, 1938, *P. H. Allen 1325*. New to Panama. Known previously from southern Mexico to Costa Rica.

HYMENODIUM CRINITUM (L.) Fée—PANAMÁ: cloud forest, Cerro Campana, alt. ca. 800 m., July 1, 1939, *P. H. Allen 1877*. New to Panama. Not uncommon in the West Indies; on the continent known previously from Mexico to Costa Rica.

POLYPODIUM KUNZEANUM C. Chr.—COCLÉ: vicinity of El Valle, alt. 800–1000 m., Sept. 5, 1938, *P. H. Allen 748*. New to Panama. A rare species, known previously from Colombia, Peru, and Brazil.

POLYPODIUM NANUM Fée—CHIRIQUÍ: trail from San Felix to Cerro Flor, alt. 100–850 m., Aug. 13–14, 1939, *P. H. Allen 1946*. New to North America, our other specimens being from Trinidad, French Guiana, British Guiana, and Brazil. A variable species, probably an aggregate.

RHIPIDOPTERIS STANDLEYI Maxon—COCLÉ: vicinity of El Valle, alt. 600–1000 m., Dec. 8, 1938, *P. H. Allen 1260*. New to Panama. Known previously only from Costa Rica.

## GRAMINEAE

*(J. R. Swallen, Washington)*

BOUTELOUA FILIFORMIS (Fourn.) Griffs.—PANAMÁ: vicinity of San Carlos, alt. 0–10 m., Dec. 5, 1938, *P. H. Allen 1148*. Previously known to extend from the southwestern United States to Guatemala.

POA ANNUA L.—CHIRIQUÍ: vicinity of "New Switzerland," central valley of Río Chiriquí Viejo, alt. 1800–2000 m., Jan. 6–14, 1939, *P. H. Allen 1378*. A weedy species that might be expected almost anywhere, but previously unreported for Panama.

LUZIOLA SPRUCEANA Benth.—CANAL ZONE: vicinity of Juan Mina, alt. 30 m., Nov. 26, 1939, *A. G. B. Fairchild 2048* in part;

same locality, Jan. 14, 1940, *A. G. B. Fairchild 2096*. A South American species which has been found once before in Central America (Honduras).

ARACEAE

*(P. C. Standley, Chicago)*

SPATHIPHYLLUM **Zetekianum** Standl., sp. nov. Planta erecta terrestris ca. 60 cm. alta; folia numerosa, petiolo lamina vulgo bene longiore gracillimo 12–20 cm. longo, geniculo ca. 1 cm. longo instructo, vagina brevi persistente vix ultra 8 cm. longa atque saepius breviore; lamina anguste lanceolata vel lanceolata in sicco fere membranacea 13–20 cm. longa 2–5 cm. lata longissime angusteque attenuata, basin versus sensim attenuata, basi ipsa acutissima, supra intense viridis, subtus pallidior, nervis primariis lateralibus utroque latere ca. 6 subremotis angulo acutissimo adscendentibus; pedunculus teres gracillimus ca. 43 cm. longus 2 mm. crassus, parte stipitiformi 3 cm. longa; spatha lanceolato-ovata viridis 10.5 cm. longa 3 cm. lata, abrupte longi-acuminata vel caudato-acuminata, basi acuta; spadix cylindricus obtusissimus 1.5 cm. longus 6–7 mm. crassus pauciflorus; sepala ca. 6 biseriata libera; stylus ovarium subaequans ultra perigonium longe exsertus atque perigonio fere duplo longior, conicus.—CANAL ZONE: Zetek Trail, Barro Colorado Island, July, 1931, *D. E. Starry 27* (Herb. Field Mus., TYPE).

Three other species of *Spathiphyllum* are known more or less definitely from Panama, and all are recorded for the Canal Zone. In general appearance, and especially in foliage, *S. Zetekianum* is most like *S. floribundum* (Lind. & André) N. E. Brown (which has been recorded for the region under the erroneous name of *S. Patini* N. E. Brown), but in the latter the style does not exceed the perianth, and the spadix is therefore even rather than tuberculate in fruit. The other two species, *S. Friedrichsthalii* Schott and *S. phryniifolium* Schott, both have exserted styles, but their leaves are large and several times as broad as those of *S. Zetekianum*, and their spadices much longer and thicker, with many times as numerous flowers in each spadix.

ERIOCAULACEAE
*(H. N. Moldenke, New York)*

ERIOCAULON **Woodsonianum** Moldenke, spec. nov. Herba pumila; caule perbrevi; bracteis involucri hyalinis vel stramineis ovatis vel ellipticis vel obovatis obtusis; floribus dimeris; floris ♂ sepalis obovatis; floris ♀ sepalis late obovatis hyalinis valde alato-cristatis.

Dwarf plants; leaves tufted, erect or spreading, thin-membranaceous or pellucid, light-green, linear, 4–7 cm. long, 1.5–3 mm. wide at the middle, subulate at the apex, not at all revolute along the margins, glabrous, fenestrately many-nerved (the fenestrations especially conspicuous beneath); peduncles 5–21 per plant, slender, 6.5–19.5 cm. long, 3-costate, slightly twisted, glabrous; sheaths loose, 3–5 cm. long, much shorter than the leaves, glabrous, not fenestrate, deeply lobed at the apex; heads hemispheric, lightly flavescent-stramineous, 3–4.5 mm. in diameter; involucral bractlets scarious, hyaline or stramineous, varying from ovate to elliptic or obovate, about 3 mm. long, 2–2.5 mm. wide, obtuse at the apex, usually not much narrowed at the base; receptacular bractlets broadly elliptic, scarious, somewhat flavescent along the midrib and at the apex, hyaline toward the margins, about 2.4 mm. long and wide, rounded at the apex, somewhat narrowed at the base, decidedly navicular and closely imbricate; staminate florets: pedicellate (pedicels about 0.5 mm. long); sepals 2, free to the base, obovate, about 1.5 mm. long and about equally wide at the apex, hyaline, transparent, conduplicate around the corolla-tube, carinate in a median line on the back, slightly emarginate at the apex, erect, glabrous throughout; corolla-lobes 2, minute, obtuse, non-glanduliferous; stamens 4; anthers brown; pistillate florets: pedicellate (pedicels about 0.5 mm. long); sepals 2, broadly obovate, hyaline, transparent, about 1.7 mm. long and equally wide at the apex; slightly emarginate, flat (not conduplicate), with a very broad wing or crest on the median keel on the back, glabrous; petals 2, free, hyaline, spatulate, transparent, about 1.9 mm. long, about 0.7 mm. wide at the apex; ovary 2-celled.—PANAMÁ: margin of pool in savanna

along road between Panamá and Chepo, Nov. 29, 1934, *C. W. Dodge, A. A. Hunter, J. A. Steyermark & P. H. Allen 16717* (Herb. Missouri Bot. Gard., TYPE).

SYNGONANTHUS **Pittieri** Moldenke, spec. nov. Herba perennis; foliis caespitosis recurvatis vel adpressis 1–1.5 cm. longis dense strigosis; vaginis dense pilosis; pedunculis glabris; sepalis petalisque hyalinis glabris.

Dwarf plants; leaves few, tufted, recurved and usually closely appressed to the ground, membranous, olivaceous, linear, 1.0–1.5 cm. long, to 1 mm. wide at the middle, attenuate and subulate at the apex, densely strigose with whitish appressed antrorse hairs on both surfaces, not fenestrate; sheaths tightly appressed, 2–2.5 mm. long, greatly surpassing the leaves, densely pilose with irregular whitish hairs, deeply lobed at the apex; peduncles several per plant, stramineous, slender, rather obscurely costate, slightly twisted, glabrous; heads hemispheric, light-gray or ashy, 3.5–4.5 mm. wide; involucral bractlets membranous, narrowly obovate or oblanceolate, about 2 mm. long and 1 mm. wide, turning brown toward the middle, hyaline at the margins; receptacular bractlets none; staminate florets: pedicellate; pedicels about 0.5 mm. long, villous; sepals hyaline, transparent, narrow-elliptic, about 1.2 mm. long, about 0.5 mm. wide, glabrous; petal-tube hyaline, translucent, about 1.5 mm. long, 3-lobed at the apex; anthers 3, white; pistillate florets: pedicellate (pedicels about 0.7 mm. long, villous); sepals 3, free, hyaline, transparent, narrowly lanceolate, about 1.7 mm. long, about 0.5 mm. wide at the base, sharply acute or acuminate at the apex, glabrous throughout; petals narrowly oblong, hyaline and transparent, about 1 mm. long and 0.3 mm. wide, glabrous, connate by their margins above, free at the base.—CHIRIQUÍ: Sabana de El Boquete, alt. 700–1100 m., March 21, 1911, *H. Pittier 3316* (Herb. New York Bot. Gard., TYPE).

## BROMELIACEAE

*(L. B. Smith, Cambridge, Mass.)*

THECOPHYLLUM ANGUSTUM Mez & Wercklé—COCLÉ: north rim of El Valle de Antón, alt. 600–1000 m., Feb. 12, 1939, *P. H.*

*Allen 1645*. Known previously only from the type, collected in Costa Rica.

TILLANDSIA SPICULOSA Griseb. var. PALMANA (Mez) L. B. Smith—PANAMÁ: cloud forest near summit of Cerro Campana, alt. 800–1000 m., July 1, 1939, *P. H. Allen 1878*. Previously known from Costa Rica.

TILLANDSIA GUANACASTENSIS Standl.—COCLÉ: vicinity of El Valle de Antón, alt. ca. 600 m., Dec. 10, 1939, *P. H. Allen 2060*. Previously known from Costa Rica.

GUZMANIA DISSITIFLORA (André) L. B. Smith—COCLÉ: vicinity of El Valle de Antón, alt. ca. 600 m., Dec. 10, 1939, *P. H. Allen 2055*. Previously known from Costa Rica and Colombia.

LILIACEAE

SMILACINA **Gigas** Woodson, sp. nov. Rhizoma cormiformis subpyriformis 5–6 cm. longa 3.0–3.5 cm. lata. Caulis ca. 3 m. altus basi ca. 1 cm. diam. glaber in sicco profunde sulcatus. Folia 10–14 adscendentia oblique oblongo-elliptica apice longiuscule subcaudato-acuminata basi late obtusa cum petiolo vix bene manifesto 25–40 cm. longa 7–9 cm. lata in sicco tenue membranacea glabra venis creberrimis distinctis venulis transversalibus haud faciliter visis. Panicula pyramidalis 25–35 cm. longa 20–25 cm. lata omnino glabra vix flexuosa; ramis multis adscendentibus inferioribus 13–15 cm. longis superioribus sensim brevioribus; pedicellis approximatis sat congestis 0.5 cm. longis; bracteis vix visis. Perianthii segmenta alba vel in sicco pallide sulphurea oblongo-ovata apice rotundata 0.35 cm. longa glabra. Stamina perianthio aequilonga exserta; antheris globosis ca. 0.05 cm. diam.; filamentis subulatis glabris. Pistillum 0.15 cm. longum glabrum; stylo ovario subduplo breviore. Bacca ignota.—CHIRIQUÍ: trail from Cerro Punta to headwaters of Río Caldera, alt. 2250–2500 m., Jan. 14, 1939, *P. H. Allen 1446* (Herb. Missouri Bot. Gard., TYPE).

This species is exceedingly distinctive, both because of its relatively enormous size and the large, fleshy, corm-like rhizomes. In the region where it was found *S. paniculata* Mart. & Gal. abounds, growing much in the same fashion as its relatives

in the northern forests. I have found the latter species so uniform in the field that interpretation of *S. Gigas* as merely a variant seems out of the question.

### DIOSCOREACEAE

*(C. V. Morton, Washington, D. C.)*

DIOSCOREA CONVOLVULACEA C. & S. var. GLABRA Uline—COCLÉ: El Valle de Antón, Sept. 5, 1938, *P. H. Allen 739*. Previously known from Mexico to Costa Rica.

DIOSCOREA RACEMOSA (Kl.) Uline—COCLÉ: El Valle de Antón, Dec. 8, 1938, *P. H. Allen 1258;* PANAMÁ: cloud forest near summit, Cerro Campana, July 1, 1939, *P. H. Allen 1869*. Previously known from Costa Rica.

### ZINGIBERACEAE

RENEALMIA RUBRO-FLAVA K. Sch.—COCLÉ: north rim of El Valle de Antón, alt. 600–1000 m., Feb. 12, 1939, *P. H. Allen 1654*. Previously known only from the type collection in Ecuador *(Eggers 15121,* in Hb. Berol.), which I have not yet had the opportunity to examine. Our plant checks very well with the description, except that Mr. Allen's notes merely state "flowers cream," whereas Schumann specified the calyx as red and the corolla as yellowish. This is the largest species of the genus, however, and would be hard to mistake. The leaves are at least twice as large as those of the giant *R. exaltata*.

### ORCHIDACEAE

*(Louis O. Williams, Cambridge, Mass.)*

The collections of orchids reported here, about 120 numbers, are the most valuable that have been made in Panama in many years. The majority are from the vicinity of El Valle, Provincia de Coclé, and in Quebrada Lopez in the Canal Zone. Types of the species described are either in the Herbarium of the Missouri Botanical Garden or in the Ames Herbarium. Most of the new species and some of the old ones have been illustrated by Mr. Gordon W. Dillon.

HABENARIA STRICTISSIMA Rchb. f. var. ODONTOPETALA (Reichb. f.) L. O. Williams.—COCLÉ: Nata, about 50 m. alt., flowers

green, Sept. 12, 1938, *Allen 820;* PANAMÁ: Isla Taboga, 0–350 m. alt., flowers green, Dec. 16, 1938, *Allen 1280.* Previously known from Florida, the West Indies, Mexico to Costa Rica.

PRESCOTTIA STACHYODES (Sw.) Lindl.—COCLÉ: vicinity of El Valle, 600–1000 m. alt., Dec. 8, 1938, and Dec. 10, 1939, *Allen 1183* and *2064.* New to Panama. Previously recorded from Florida, Mexico to Costa Rica and the West Indies. The present specimens represent a large-leaved form. The lamina of the largest leaf is 22 cm. long and 15.5 cm. broad.

PONTHIEVA MACULATA Lindl.—CHIRIQUÍ: epiphytic, trail from Cerro Punta to headwaters of Río Caldera, 2250–2500 m. alt., flowers brown, covered with glandular hairs, Jan. 14, 1939, *Allen 1430.* Apparently not recorded from Panama previously but rather widely distributed from Mexico to Costa Rica and in northern South America.

PONTHIEVA RACEMOSA (Walt.) Mohr—COCLÉ: vicinity of El Valle, 600–1000 m. alt., flowers white, Dec. 8, 1938, *Allen 1161.* Not an uncommon plant from Virginia to Florida, the West Indies, Mexico to northern South America, but apparently not recorded from Panama previously.

STELIS **montana** L. O. Williams, sp. nov. Herbae caespitosae, epiphyticae, usque ad 33 cm. altae. Caules secundarii quam folia breviores. Folia oblanceolata, obtusa, coriacea. Inflorescentia racemosa, plusminusve secunda, quam folia longior vel aequitans. Sepala basi connata. Sepalum dorsale ovatum vel lanceolato-ovatum, acutum, apiculatum, quinquenervium. Sepala lateralia late ovata, plusminusve obliqua, acuta, apiculata, basi mentum inconspicuum formantia. Petala plusminusve orbicularia, bidentata. Labellum oblongum vel oblongo-obovatum, obscure trilobatum, basi callo magno ornatum.

Large (for the genus) caespitose epiphytic herbs up to 33 cm. tall. Secondary stems 11–13 cm. long, covered by sheathing cauline bracts, shorter than the leaves. Leaves 17–20 cm. long and 3–3.5 cm. broad, oblanceolate, obtuse, coriaceous, gradually narrowed into a short petiole. Inflorescence racemose, as long as or longer than the subtending leaf, more or less secund.

Flowers rather large for the genus, green. Sepals connate for a short distance at their bases. Dorsal sepal 6 mm. long and 3.5 mm. broad (free portion 4.5 mm. long), ovate to lanceolate-ovate, acute, apiculate, 5-nerved. Lateral sepals about 5 mm. long and 4.5 mm. broad, broadly ovate, somewhat oblique, acute, apiculate, 5-nerved, forming a short and inconspicuous mentum at the base. Petals about 1.5 mm. long and 1.5 mm. broad, nearly orbicular, with a small tooth on each side near the middle, terminal half conspicuously thickened. Lip about 2–2.25 mm. long and 0.8–1 mm. broad, oblong to oblong-obovate, obscurely 3-lobed, with a large callus which fills more than the basal half of the lip, terminal part of the lip thin and (when spread out) suborbicular, minutely puberulent dorsally. —CHIRIQUÍ: trail from Cerro Punta to headwaters of Río Caldera, 2250–2500 m. alt., Jan. 4, 1939, *Allen 1463* (Herb. Missouri Bot. Gard., TYPE).

*Stelis montana* is a rather distinctive species which is not closely allied to any other species known to me.

STELIS STORKII Ames—COCLÉ: epiphytic, wet north rim, vicinity of El Valle, 800–1000 m. alt., May 21, 1939, *Allen 1826*. This recently described species is new to Panama, having been found first in Costa Rica.

MASDEVALLIA **Allenii** L. O. Williams, sp. nov. (pl. 31, figs. 12–16). Herbae caespitosae, epiphyticae. Caules secundarii breves, unifoliati. Folia linearia, acuta, coriacea, semiteretia et canaliculata. Inflorescentia uniflora; pedunculus elongatus, glaber. Sepala ad basim tubo connata. Sepalum dorsale longe caudatum; lamina triangularis. Sepala lateralia plusminusve ad apicem connata, lanceolata, cum antenna laterali prope apicem, basi gibbosa. Petala oblonga, uninervia, apice rotundata, obtusa, integra. Labellum lanceolatum vel oblongo-lanceolatum, obtusum, basi bicaudatum; lamina bicallosa. Columna generis.

Small caespitose epiphytic herbs. Secondary stems very short, about 3 mm. long, covered by white chartaceous bracts, unifoliate. Leaves 10–20 mm. long, up to 2 mm. broad, linear, acute, coriaceous, subterete and canaliculate. Inflorescence 1-

flowered, subtending bract about 1 mm. long, triangular or nearly so; peduncle elongate, 3–4 cm. long, very slender, smooth. Sepals joined into a tube at the base, 3-nerved. Dorsal sepal long-caudate, free portion of the lamina triangular, about 2.5–3 mm. long and 3–3.5 mm. broad at the base; caudate termination filiform, about 10 mm. long. Lateral sepals connate to their apices or nearly so, lanceolate, 12–15 mm. long, together 4.5–5 mm. broad, gibbous at their bases, each with a lateral filiform appendage 5–6 mm. long situated about 2 mm. from its apex. Petals 1.5–2 mm. long and about 0.75 mm. broad, oblong, 1-nerved, apex rounded, obtuse, entire. Lip about 3 mm. long and 1 mm. broad, lanceolate or lanceolate-oblong, obtuse, 3-nerved, bicaudate at the base, lamina with two longitudinal calluses. Column of the genus.—COCLÉ: vicinity of El Valle, 600–1000 m. alt., Dec. 8, 1938, *Allen 1230* (Herb. Missouri Bot. Gard., TYPE).

*Masdevallia Allenii* is allied to *M. triaristella* Rchb. f. It differs in being a smaller plant with much smaller flowers, differently shaped petals with entire, rounded apices, and much shorter leaves.

MASDEVALLIA CHONTALENSIS Rchb. f.—COCLÉ: vicinity of El Valle, 600–1000 m. alt., flowers white with yellow-tipped spurs, Dec. 8, 1938, *Allen 1231;* epiphytic, vicinity of El Valle, north rim (wet), 800–1000 m. alt., May 21, 1939, *Allen 1826.* New to Panama. Previously recorded from Nicaragua and Costa Rica where it is not uncommon.

MASDEVALLIA ECAUDATA Schltr.—CHIRIQUÍ: valley of upper Río Chiriquí Viejo, "flowers white with three purple stripes on outer petals," Jan. 18, 1938, *White & White 81.* New to Panama but not uncommon in Costa Rica.

MASDEVALLIA SIMULA Rchb. f. (pl. 31, figs. 1–8)—CANAL ZONE: in tops of high trees, Quebrada Lopez, 30 m. alt., flowers clear, striped and barred red, Feb. 11, 1940, *Allen 2115.* New to the flora of Panama. Previously recorded from Guatemala, Honduras, Costa Rica, Colombia and Ecuador. An illustration of the species has been prepared from specimens preserved in spirits.

LEPANTHES **rotundifolia** L. O. Williams, sp. nov. (pl. 31, figs. 9–11). Herbae caespitosae, epiphyticae, parvae, usque ad 8 cm. altae. Caulis gracilis, unifoliatus. Folia orbicularia vel orbiculari-ovata, coriacea. Inflorescentia disticha, quam folia brevior, pauciflora. Sepalum dorsale suborbiculare, obtusum vel acutum, trinervium, ad basim connatum. Petala trilobata; lobus prope sepalum dorsale longior, lanceolatus, acutus, obliquus, uninervius; lobus prope sepala lateralia lanceolatus, acutus, obliquus, uninervius. Labellum bilobatum, lobis malleoliformibus. Columna generis.

Small caespitose, epiphytic herbs up to 8 cm. tall. Secondary stems slender, covered by sheaths, bearing a single leaf at their apices; sheaths glabrous except the ciliate margins. Leaves about 25 mm. long and 19–28 mm. broad, orbicular or orbicular-ovate, or even broader than long, coriaceous. Inflorescence distichous, shorter than the subtending leaf, few-flowered. Dorsal sepal about 3 mm. long and 2 mm. broad, suborbicular, abruptly acuminate, 3-nerved. Lateral sepals about 2.5 mm. long and 2 mm. broad, suborbicular, obtuse or acutish, 3-nerved, connate at their bases. Petals bipartite; lobes near the dorsal sepal longest, about 3.5 mm. long and 1 mm. broad, lanceolate, acute, oblique, 1-nerved; lobes near the lateral sepals about 2 mm. long and 0.8 mm. broad, lanceolate, acute, oblique, 1-nerved. Lip 2-lobed, about 1.5 mm. long and 2 mm. broad, each lobe malleoliform. Column about 1.5 mm. long, clavate.—COCLÉ: epiphytic, wet north rim, vicinity of El Valle, 800–1000 m. alt., May 21, 1939, *Allen 1835* (Herb. Missouri Bot. Gard., TYPE).

*Lepanthes rotundifolia* is somewhat allied to *L. Turialvae* Rchb. f., from which it differs in the broader leaves and shape of petals, as well as other characters.

PLEUROTHALLIS **Allenii** L. O. Williams, sp. nov. (pl. 34, figs. 5–7). Herbae epiphyticae, caespitosae, parvae, usque ad 12 cm. altae. Caulis secundarius quam folia brevior. Folia ligulata vel lineari-ligulata, obtusa vel tridentata, coriacea. Inflorescentia uniflora, saepissime fasciculo nonnullae, flores pro planta magni, quam folia breviores. Sepalum dorsale lanceolatum,

longe attenuato-acuminatum, trinervium. Sepala lateralia plusminusve usque ad apicem connata, junta laminam lanceolatam, acutam formantia. Petala lanceolata, acuta vel acuminata, paulo obliqua. Labellum trilobatum; lobi laterales erecti (expansi plani), apice rotundati; lobus medius anguste triangularis, acutus, echinulatus; discus carnosus cum callo tripartito prope medium. Columna generis.

Small epiphytic, caespitose herbs up to about 12 cm. high. Secondary stems 3–5 cm. long, slender, invested at the base by one or two sheaths, shorter than the leaves. Leaves 5–8 cm. long, 3–6 mm. broad, ligulate to linear-ligulate, obtuse or tridentate, coriaceous. Inflorescence a 1–several-flowered fascicle, much exceeded by the leaves, the flowers large for the size of the plant, dull red. Dorsal sepal about 15 mm. long and 4 mm. broad, lanceolate, long attenuate-acuminate, 3-nerved. Lateral sepals connate nearly to their apices, about 15 mm. long and together 5 mm. broad, lanceolate, acute, each sepal 2-nerved. Petals about 12 mm. long and 3 mm. broad, lanceolate, acute or acuminate, 3-nerved, slightly oblique. Lip about 4 mm. long and as broad, 3-lobed; the lateral lobes erect, about 1.25 mm. long and 1 mm. broad, broadly oblong, the apices rounded; the mid-lobe about 2 mm. long and 1.5 mm. broad at the base, narrowly triangular, acute; disc (including mid-lobe) very fleshy, with a tripartite raised callus near the middle and the mid-lobe covered with echinulate protuberances. Column short, about 1.5 mm. long; column-foot small.—COCLÉ: vicinity of El Valle, alt. 600–1000 meters, flowers dull red, Dec. 8, 1938, *Allen 1240* (Herb. Missouri Bot. Gard., TYPE).

*Pleurothallis Allenii* is a rather handsome species which is somewhat allied to *P. Rowleei* Ames, from which it differs in several respects.

PLEUROTHALLIS CALYPTROSTELE Schltr. (pl. 33, figs. 11–15).—COCLÉ: vicinity of El Valle, 600–1000 m. alt., Dec. 8, 1938, *Allen 1233*. New to the flora of Panama, previously known from Costa Rica. There are a few minor differences between the present specimens and the usual Costa Rican material.

PLEUROTHALLIS **cobraeformis** L. O. Williams, sp. nov. (pl. 34, figs. 7–14). Herbae parvae, epiphyticae, usque ad 13 cm. altae. Caules secundarii foliis subaequales. Folia oblanceolata, obtusa vel acuta. Inflorescentia uni–pauciflora, quam folia brevior. Sepalum dorsale suborbiculare, cucullatum. Sepala lateralia connata, late ovalia. Petala elliptica, acuta, dentato-ciliata, uninervia. Labellum breviter unguiculatum; lamina apiculata, late cordata, carnosa. Columna generis.

Small caespitose, epiphytic herbs up to 13 cm. tall. Secondary stems mostly 4–6 cm. long, slender, subequal to the leaves in length or a little longer. Leaves 4–6 cm. long and 8–11 mm. broad when mature, oblanceolate, obtuse or acute, fleshy. Inflorescence a 1–several-flowered fascicle or possibly an abbreviated raceme, much exceeded by the subtending leaf. Dorsal sepal 8–10 mm. long, 7–9 mm. broad, suborbicular, subacute, strongly cucullate. Lateral sepals connate to their tips, about 6–7 mm. long and 4.5–5 mm. broad, broadly oval, 4-nerved. Petals 4–6 mm. long and 1.2–1.5 mm. broad, elliptic, acute, arcuate, dentate-ciliate, 1-nerved. Lip about 3.5 mm. long and as broad, short-clawed; lamina apiculate, broadly cordate, fleshy, sharply deflexed, the basal auricles rounded. Column about 2 mm. long; column-foot very short.—COCLÉ: epiphytic, vicinity of El Valle de Antón, ca. 600 m. alt., flower tan spotted with maroon, Dec. 19, 1939, *Allen 2057* (Herb. Ames, No. 58413, TYPE).

*Pleurothallis cobraeformis* is allied to *P. gonioglossa* Schltr. It may be distinguished by the very much larger flowers; broader hood-shaped dorsal sepal; broader lateral sepals; and by the comparatively narrower oblanceolate leaves.

PLEUROTHALLIS EUMECOCAULON Schltr.—COCLÉ: vicinity of El Valle, 600–1000 m. alt., flowers white, Dec. 8, 1938, *Allen 1237*. New to Panama, previously known only from Costa Rica.

PLEUROTHALLIS **hispida** L. O. Williams, sp. nov. (pl. 33, figs. 1–4). Herbae caespitosae, epiphyticae, parvae, usque ad 5 cm. altae. Caulis secundarius quam folia brevior. Folia anguste elliptica vel elliptico-ovata, obtusa, coriacea, quam caules

longiora, margine hispida vel hispidula. Inflorescentia univel pauciflora, saepissime fasciculata, foliis multo brevior. Sepalum dorsale cum sepalis lateralibus usque ad medium connatum, lanceolatum, acutum, dorso hispidulum. Sepala lateralia usque ad apicem connata, cucullata, carinata, extus hispidula et intus papillosa. Petala lineari-oblonga, apice oblique truncata et acuta, binervia. Labellum unguiculatum; lamina oblongo-lanceolata, tricallosa, margine anteriore integra vel denticulata; unguis ad basim biauriculatus. Columna ad apicem auriculato-alata.

Small caespitose, epiphytic herbs up to about 5 cm. tall. Secondary stems 0.5–2 mm. long, shorter than the leaves; stems invested by two or three cauline sheaths, the upper one reaching to the base of the leaf where it is subinfundibuliform, the sheaths maculated with maroon dots and hispid, at least along the angles. Leaves 1–3.5 cm. long, 0.3–1.3 cm. broad, narrowly elliptic to elliptic-oval, obtuse, coriaceous, exceeding the secondary stems in length, margins hispid or hispidulous. Inflorescence 1–few-flowered, fasciculated, much exceeded by the leaves. Flowers 7–8 mm. long, maroon. Dorsal sepal connate for half its length with the laterals, 5–6 mm. long, lanceolate, acute, 3-nerved, hispidulous dorsally. Lateral sepals about 6 mm. long and together about 6 mm. broad, connate to their tips, strongly cucullate, in natural position calceolate and resembling the lip of *Cypripedium acaule* Aiton in outline, carinate, hispidulous outside and papillose within, each sepal 3-nerved. Petals about 4 mm. long and 1 mm. broad, linear-oblong, the apex obliquely truncate and acute, 2-nerved. Lip about 3 mm. long and 1.5 mm. broad, unguiculate; lamina oblong-lanceolate, with a lamellate callus extending from each lateral angle toward the apex and with a mamillate callus at the junction of the claw and the lamina, margins toward the apex entire or denticulate; claw about 0.5 mm. long, minutely biauriculate at the base. Column about 2.5 mm. long, auriculate-winged toward the apex; column-foot bulbose, about 1 mm. long.—COCLÉ: vicinity of El Valle, 800–1000 m. alt., Sept. 5, 1939, *Allen 782* (Herb. Ames, No. 57755, TYPE); vicinity of El Valle, 600–1000 m. alt., Dec. 8, 1938, *Allen 1243*.

*Pleurothallis hispida* is not closely allied to any species known to me. The two collections cited differ in vegetative size but otherwise seem to be identical.

PLEUROTHALLIS HOMALANTHA Schltr.—COCLÉ: vicinity of El Valle, 600–1000 m., alt., flowers brown, Dec. 8, 1938, *Allen 1236*. New to the flora of Panama.

PLEUROTHALLIS **lepidota** L. O. Williams, sp. nov. (pl. 32, figs. 8–12). Herbae caespitosae, epiphyticae, parvae, usque ad 22 cm. altae. Caulis secundarius gracilis. Folia elliptica vel elliptico-lanceolata, breviter acuminata. Inflorescentia racemosa, pauciflora, folio brevior. Sepalum dorsale lineari-lanceolatum, acutum, trinervium, carinatum. Sepala lateralia subtriangularia, plusminusve usque ad apicem connata, acuminata, dorso carinato-alata. Petala linearia, acuta, uninervia. Labellum unguiculatum, obscure trilobatum, intus lepidotum vel lepidoto-verrucosum, callo mammillato ad unguis et laminae junctionem; lobi laterales rotundati, erecti; lobus medius oblongo-lanceolatus, acutus. Columna generis; clinandrium serrulatum.

Small caespitose, epiphytic herbs up to about 22 cm. tall. Secondary stems about 9–12 cm. long, slender, partially invested with 2–3 scarious sheaths. Leaves 7–10 cm. long, 3–3.5 cm. broad, elliptic to elliptic-lanceolate, short-acuminate. Inflorescence racemose, few-flowered, one or more from the axil of a leaf, shorter than the leaf; bract subtending the inflorescence about 1.5 mm. long, chartaceous, lanceolate; bracts of the inflorescence about 3 mm. long, ovate-lanceolate, surrounding the rachis. Dorsal sepal 13–14 mm. long and about 2 mm. broad, linear-lanceolate, acute, 3-nerved, carinate. Lateral sepals about 14 mm. long and (together) 12 mm. broad at their base, nearly triangular, connate nearly to their apices, acuminate, each 3-nerved and carinate-winged along the mid-nerve dorsally, outer surface papilliferous. Petals about 5 mm. long and 0.25 mm. broad, linear, acute, 1-nerved. Lip about 8 mm. long and 5 mm. broad, unguiculate, obscurely 3-lobed, upper surface lepidote or lepidote-verrucose, with a mammillate callus at the junction of the claw and the lamina, margins serrulate to serrate; lateral lobes 2 mm. long and as broad, rounded,

erect in natural position; mid-lobe oblong-lanceolate, acute, about 4–5 mm. long, and 2 mm. broad. Column 4–5 mm. long; clinandrium serrulate.—CHIRIQUÍ: epiphytic, Llanos del Volcán, about 1300 m. alt., flowers green striped maroon, Jan. 23, 1939, *Allen 1552* (Herb. Ames, No. 57700, TYPE).

A handsome large-flowered species not closely allied to any other in Central America.

PLEUROTHALLIS **pterocaulis** L. O. Williams, sp. nov. (pl. 32, figs. 1–7). Herbae epiphyticae, repentes, usque ad 16.5 cm. altae. Caulis secundarius alatus vel angulatus, quam folia brevior. Folia elliptica vel elliptico-lanceolata, acuta, coriacea. Inflorescentia uni- vel pauciflora racemorum fasciculus, folio brevior. Sepalum dorsale oblongo-lanceolatum, obtusum vel acutum, naviculare, carinatum. Sepala lateralia usque ad medium connata, oblongo-lanceolata, plusminusve obliqua, acuta, trinervia, carinata. Petala subrhombico-obovata, uninervia, ad apicem serrulata. Labellum unguiculatum, oblongo-lanceolatum, obtusum, carinatum, bicallosum; unguis basi inconspicue biauriculatus.

Repent epiphytic herbs up to 16.5 cm. tall. Secondary stems 2.5–7 cm. long, winged or strongly angled (at least when dry), shorter than the leaves. Leaves 4–11 cm. long, 1–1.5 cm. broad, elliptic to elliptic-lanceolate, acute, coriaceous. Inflorescence a fascicle of 1–few-flowered racemes, much exceeded by the leaves. Dorsal sepal about 6 mm. long and 2–2.5 mm. broad, oblong-lanceolate, obtuse or acute, strongly navicular, carinate with the apex thickest. Lateral sepals connate for about half or more their length, 5–6 mm. long and together about 5 mm. broad; each sepal oblong-lanceolate, somewhat oblique, acute, 3-nerved, carinate, with a thicker carinate cushion toward the free margin. Petals about 2.5 mm. long and 1.7 mm. broad, subrhombic-obovate, 1-nerved, the apical margin serrulate. Lip about 4 mm. long and 1.5 mm. broad, unguiculate, oblong-lanceolate, obtuse, carinate, with two inconspicuous calluses at the junction of the claw and the lamina; the claw inconspicuously biauriculate at the base. Column about 2.5 mm. long; column-foot about 1.5 mm. long.—COCLÉ: vicinity of El Valle,

600–1000 m., alt., flowers dull red, Dec. 8, 1938, *Allen 1239* (Herb. Ames, No. 57701, TYPE).

*Pleurothallis pterocaulis* is allied to *P. hondurensis* Ames, from which it may be distinguished by the subrhombic-obovate, obtuse petals, instead of lanceolate, acute petals, and by other vegetative and floral details.

PLEUROTHALLIS **simulans** L. O. Williams, sp. nov. (pl. 33, figs. 8–10). Herbae epiphyticae, caespitosae, parvae, usque ad 10 cm. altae. Caules secundarii graciles, foliis subaequales vel paulo longiores. Folia ligulata vel elliptico-oblanceolata, obtusa, coriacea, submarginata. Inflorescentia uniflora vel fasciculata et pauciflora, quam folia brevior. Sepalum dorsale lanceolatum, acuminatum, trinervium. Sepala lateralia usque ad apicem connata, lanceolata, acuminata. Petala late elliptica vel subrhombica, acuta vel acuminata, uninervia, fere usque ad basim lacerato-ciliata. Labellum integrum, subcordatum, acuminatum, trinervium, margine anteriore plusminusve serrulatum; discus callo carinato ornatus.

Small epiphytic, caespitose herbs up to 10 cm. tall. Secondary stems 2.5–6 cm. long, slender, usually a little longer than the leaves, with one or two sheathing bracts at the base. Leaves 3–5 cm. long, 5–8 mm. broad, ligulate to elliptic-oblanceolate, obtuse, coriaceous, submarginate. Inflorescence 1-flowered or a few-flowered fascicle, much exceeded by the subtending leaf, subtending bract lanceolate, apiculate. Dorsal sepal about 10 mm. long and 3.5–4 mm. broad, lanceolate, acuminate, 3-nerved. Lateral sepals connate to their apices, about 10 mm. long and together 4.5–5 mm. broad, broadly lanceolate, acuminate, each half with only two prominent nerves. Petals 5–6 mm. long and 2–2.5 mm. broad, broadly elliptic to subrhombic, acute or acuminate, 1-nerved, lacerate-ciliate nearly to the base. Lip 3–3.5 mm. long and 2–2.5 mm. broad, simple, subcordate in outline, acuminate, 3-nerved, the anterior margin somewhat serrulate, the disc covered by a thick callus simulating that found in species of *Stelis*, the callus with an anterior rim, an inconspicuous depression toward its apex and sharply declined to the attachment of the lip. Column very short and dilated at the

apex; stigmas apparently confluent.—COCLÉ: epiphyte, north rim of El Valle, flowers maroon, July 9, 1939, *Allen 1912* (Herb. Missouri Bot. Gard., TYPE).

*Pleurothallis simulans* is not allied to any other known species of Central American *Pleurothallis*. The species is particularly interesting in that the lip and the column suggest the allied genus *Stelis*. However, the species seems to belong to *Pleurothallis* as that genus is now constituted. The genera of the Pleurothallideae need critical comparative morphological study, and the present species should prove interesting when that work is done.

LIPARIS FRATRUM Schltr.—CHIRIQUÍ: creeping terrestrial, vicinity of Cerro Punta, 2000 m. alt., "roots being produced from leaf axils," flowers green, Jan. 21–24, 1939, *Allen 1528*. New to the flora of Panama. Previously recorded from Costa Rica.

EPIDENDRUM CRINIFERUM Rchb. f.—COCLÉ: epiphytic, north rim of El Valle de Antón, 600–1000 m. alt., flowers tan spotted red, Feb. 12, 1939, *Allen 1679*. New to Panama. Previously recorded from Costa Rica and Peru.

EPIDENDRUM REPENS Cogniaux—CHIRIQUÍ: pendent epiphytic plant, flowers maroon, vicinity of Cerro Punta, 2000 m. alt., Jan. 21–24, 1939, *Allen 1530*. New to Panama. Previously known from Mexico, Costa Rica, Cuba, Jamaica, and Venezuela.

EPIDENDRUM TRIANGULABIUM Ames & Schweinf.—COCLÉ: vicinity of El Valle, 600–1000 m. alt., Dec. 8, 1938, *Allen 1245*. A rare species which is new to Panama. Previously known from Costa Rica.

LAELIA **Lueddemanii** (Prill.) L. O. Williams, comb. nov. (*Schomburgkia Lueddemanii* Prill., in Jour. Soc. Imp. Hort. Paris **8**: 275. 1862; Rolfe, in Bot. Mag. **138**: *t. 8427*. 1912)—COCLÉ: mountains beyond La Pintada, 400–600 m. alt., *Hunter & Allen 509*.

MAXILLARIA **Allenii** L. O. Williams, sp. nov. (pl. 35). Herbae epiphyticae, erectae vel adscendentes, sine pseudobulbis, usque ad 3.7 dm. altae. Caules teretes vel complanati, foliosi. Folia anguste oblonga, emarginata, obtusa, coriacea, conferta, dis-

ticha. Inflorescentia florum fasciculus ex foliorum axillis. Sepalum dorsale oblongo-lanceolatum, acutum, 3–(5)-nervium, carnosum. Sepala lateralia oblongo-lanceolata, acuta, carnosa, paulo obliqua, columnae pedi adnata. Petala oblanceolata, acuta, trinervia. Labellum ovatum, trilobatum, obtusum, carnosum; lobi laterales parvi; lobus medius oblongus. Columna generis, arcuata.

Erect or assurgent epiphytic herbs without pseudobulbs, up to 3.7 dm. tall. Stems terete or flattened, up to about 1 cm. thick, covered with the persistent leaf-sheaths. Leaves 4–7 cm. long, 1.2–2 cm. broad, narrowly oblong, emarginate, obtuse, coriaceous, crowded on the stem, distichous. Inflorescence a fascicle of single flowers from the axils of leaves; rachis of each flower about 2 cm. long, covered with about three lanceolate, scarious bracts. Dorsal sepal about 9 mm. long and 2.5 mm. broad, oblong-lanceolate, acute, 3–(5)-nerved, fleshy. Lateral sepals about 8–9 mm. long and 2.5 mm. broad, oblong-lanceolate, fleshy, acute, somewhat oblique, adnate to the column-foot. Petals about 8 mm. long and 2.7 mm. broad, oblanceolate, acute, 3-nerved. Lip about 6.5 mm. long and 3–3.5 mm. broad, oval in outline, obtuse, fleshy; lateral lobes small, their points at about the middle of the lip; mid-lobe oblong, with a linear-oblong callus about 2–2.5 mm. long. Column about 3 mm. long, arcuate; column-foot 1–1.5 mm. long.—COCLÉ: epiphytic, north rim of El Valle de Antón, 600–1000 m. alt., flowers yellow, Feb. 12, 1939, *Allen 1650* (Herb. Missouri Bot. Gard., TYPE).

*Maxillaria Allenii* is allied to *M. dendrobioides* (Schltr.) L. Wms.,[1] a species which occurs in Costa Rica and Panama, but may be distinguished from it by the larger leaves, by a number of flowers from the axil of a leaf instead of a single flower, and by details of the flowers.

MAXILLARIA CHARTACIFOLIA Ames & Schweinf.—COCLÉ: vicinity of El Valle, 600–1000 m. alt., flowers brown, Dec. 8, 1938, *Allen 1256*. A rare species previously known only from the province of Guanacaste in Costa Rica. The present specimen is somewhat smaller than those from Costa Rica.

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[1] MAXILLARIA **dendrobioides** (Schltr.) L. O. Williams, comb. nov. (*Camaridium dendrobioides* Schltr. in Beih. Bot. Centralbl. **36**, Abt. 2: 415. 1918.)

MAXILLARIA **Wercklei** (Schltr.) L. O. Williams, comb. nov. (*Ornithidium Wercklei* Schltr. in Fedde's Repert. Beih. **19**: 60, 244, 305. 1923).—COCLÉ: vicinity of El Valle, 600–1000 m. alt., petals and sepals tan with brown stripes, lip brown, Dec. 8, 1938, *Allen 1253*. New to the flora of Panama, previously known from Costa Rica.—It is not unlikely that *Maxillaria Lankesteri* Ames and *Ornithidium aurantiacum* Schltr. belong here as synonyms.

CRYPTOCENTRUM GRACILLIMUM Ames & Schweinf.—COCLÉ: epiphytic, north rim of El Valle, July 9, 1939, *Allen 1911*. *Cryptocentrum gracillimum* was originally described from "Pejivalle," Costa Rica. The type specimen was, until the present time, the only known collection of the species. The genus is new to the flora of Panama.

CRYPTOCENTRUM STANDLEYI Ames—COCLÉ: north rim of El Valle de Antón, 600–1000 m. alt., flowers tan, Feb. 12, 1939, *Allen 1685*. A very rare species which was known previously only from Costa Rica.

ONCIDIUM GLOBULIFERUM HBK.—CHIRIQUÍ: vine growing in the tops of the tallest trees, vicinity of Cerro Punta, 2000 m. alt., Jan. 21–24, 1939, *Allen 1567*. New to Panama and Central America, previously recorded from Colombia and Venezuela. A variety which occurs in Costa Rica, var. *costaricense* Rchb. f., may not be distinct.

SIGMATOSTALIX **abortiva** L. O. Williams, sp. nov. (pl. 34, figs. 1–6). Herbae epiphyticae, caespitosae, parvae, usque ad 12 cm. altae. Pseudobulbi ancipites, oblongi vel ovati, unifoliati. Folia elliptica vel lanceolata, acuta, subcoriacea. Inflorescentia erecta, folia multo excedens, racemosa. Sepala lanceolata, acuta, uninervia. Petala quam sepala latiora, late lanceolata, acuta, uninervia vel basi obscure trinervia. Labellum simplex, unguiculatum; lamina suborbicularis, truncata; unguis callo cucullato ornatus. Columna generis.

Small, caespitose, epiphytic herbs up to 12 cm. tall. Pseudobulbs 1–2 cm. long, 3–10 mm. broad, oblong to ovate, ancipitous, vernicose, unifoliate at the apex, usually with one small subtending leaf on each edge of the pseudobulb. Leaves 2.5–

4 cm. long, 4–10 mm. broad, elliptic-lanceolate, acute, subcoriaceous. Inflorescence lateral, in a loose raceme much exceeding the leaves in length; bracts at the base of the pedicel sometimes bifurcate, bracts on the pedicel two, the lower one with a sterile ligule in its axil and the upper one fertile. Sepals about 3.2 mm. long and 0.8–1 mm. broad, lanceolate, acute, 1-nerved, obscurely apiculate. Petals about 3.2 mm. long and 1.3 mm. broad, broadly oblanceolate, acute, 1-nerved or obscurely 3-nerved at the base, obscurely apiculate. Lip about 5 mm. long and 3.5 mm. broad; the lamina about 3.3 mm. long, suborbicular, slightly retuse, truncate; the claw about 1.8 mm. long, slender, covered by a large cucullate callus. Column of the genus, about 3 mm. long.—CANAL ZONE: Quebrada Lopez, 30 m. alt., sepals and petals yellow, lip white, Feb. 11, 1940, *Allen 2121* (Herb. Missouri Bot. Gard., TYPE).

*Sigmatostalix abortiva* is more closely allied to *S. guatemalensis* Schltr. than to any other species. It is similar in habit, type of inflorescence and general structure of the flower but differs in most all floral details.

The inflorescence is an interesting one. It can be described as a raceme but on examination of the presumed pedicel of each flower two bracts are found. The lower bract has a ligule in its axil and the upper one subtends the flower. It is probable that the ligule represents an aborted flower (hence the specific name) and that the whole inflorescence is a reduced panicle; perhaps reduced from a type similar to that found in *Sigmatostalix hymenantha* Schltr. or *S. racemifera* L. Wms.

The inflorescence of *Sigmatostalix guatemalensis* Schltr. is similar to that of *S. abortiva* except for the greater number of bracts. There is no indication, on the fifteen specimens in the Ames Herbarium, that more than one flower is borne from each set of bracts. However in Rolfe's plate of *S. costaricensis* Rolfe (Bot. Mag. **145**: *t. 8825.* 1919), which is a synonym of *S. guatemalensis,* such a condition is shown.

SIGMATOSTALIX **racemifera** L. O. Williams, sp. nov. (pl. 36). Herbae epiphyticae, parvae, erectae, usque ad 15 cm. altae. Pseudobulbi ovati vel obovati, apice unifoliati et utrinque

foliis suffulti. Folia erecta, elliptica vel elliptico-oblanceolata, acuta, coriacea. Inflorescentia lateralis, folia excedens; racemus paniculatus, i. e. e racemis lateralibus densifloris brevibus constans. Sepalum dorsale lanceolatum, acutum, uninervium. Sepala lateralia late lanceolata, acuta vel acuminata, uninervia, basi paulo connata. Petala anguste ovato-lanceolata, acuta, uninervia vel obscure trinervia. Labellum subquadratum, panduratum, trilobatum, callo quadrisulcato ad basim ornatum; lobus medius lobis lateralibus subaequalis. Columna gracilis, malleoliformis.

Small erect epiphytic herbs up to 15 cm. tall. Pseudobulbs 2–3.5 cm. long, 1–2 cm. broad, probably about 5 mm. thick, oval to obovate, summit unifoliate, with a subtending leaf on either margin of the pseudobulb. Leaves erect, 4–8 cm. long, 8–18 mm. broad, elliptic to elliptic-oblanceolate, acute, coriaceous. Inflorescence a paniculate raceme—with short, lateral, densely flowered branches—the inflorescence exceeding the leaves. Dorsal sepal about 3 mm. long and 0.75 mm. broad, lanceolate, acute, 1-nerved. Lateral sepals about 2.5 mm. long and 0.8 mm. broad, broadly lanceolate, acute or abruptly acuminate, connate for a short distance at their bases. Petals about 3 mm. long and 1.25 mm. broad, narrowly ovate-lanceolate, acute, 1-nerved or obscurely 3-nerved. Lip about 3 mm. long and 3.5 mm. broad, subquadrate, pandurate, 3-lobed; the mid-lobe equal in size to the two lateral lobes; with a raised subquadrate callus at the base about 1.2 mm. long and 1.1 mm. broad and having four subequal, longitudinal chambers above. Column about 5 mm. long, slender, malleoliform; the terminal portion somewhat thicker than the basal portion and with the elongated stigma on its lower side; anther decumbent.—COCLÉ: vicinity of El Valle, 600–1000 m. alt., flowers yellow, Dec. 8, 1938, *Allen 1232* (Herb. Missouri Bot. Gard., TYPE).

*Sigmatostalix racemifera* is closely allied to *S. hymenantha* Schltr., which it simulates in habit and in having the inflorescence made up of small lateral clusters of flowers on an elongated rachis. It differs in the shape of the lip, and in the structure of the callus and the column.

PIPERACEAE
*(W. Trelease, Urbana, Ill.)*

PIPER **affectans** Trel., spec. nov. Arbor 10 m. alta, foliorum nervis subtus velutinis caeterumque glabra. Folia ovata subacuta profunde cordata 35 cm. lata 50 cm. longa sub parte tertia superiore pinnate nervata post exsiccationem illustria venoso-areolataque, venis utroque latere ca. 8; petiolo 17 cm. longo alato basi aliquid verrucoso. Spicae 30–50 cm. longae basi ca. 0.8 cm. diam.; pedunculo 2 cm. longo.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, alt. ca. 1500–2000 m., June 28–July 2, 1938, *Woodson, Allen & Seibert 865* (Herb. Univ. Illinois, TYPE).

PIPER **albopunctulatissimum** Trel., spec. nov. Frutex nodosus fere glaber ca. 4 m. altus; internodiis superioribus sat brevibus gracilibusque exigue angusteque verrucosis. Folia elliptica vix acuminata cordato-auriculata latere maiore petiolum fere aequante ca. 20 cm. longa 15 cm. lata sub tertio superiore pinnate nervata nervis ca. 6 + 7, supra copiose albopunctulata subtus nervis leviter puberulis; petiolis 4.5 + 0.5 cm. longis exigue angusteque verrucosis. Spicae 17–20 cm. longae ca. 0.5 cm. crassae; pedunculo ca. 4 cm. longo.—COCLÉ: north rim of El Valle de Antón, alt. 600–1000 m., Feb. 12, 1939, *P. H. Allen 1652* (Herb. Univ. Illinois, TYPE).

PIPER **Alstoni** Trel., spec. nov. Suffrutex *P. auritae* propinquus ca. 3 m. altus, ramis et petiolis et pedunculis foliisque subtus ad tempus cinereo-velutinis; internodiis sat brevibus gracilibusque. Folia rotundo-ovata sub more breviter acuminata cordato-auriculata latere maiore petiolum fere aequante 22–30 cm. longa 15–18 cm. lata pinnate nervata nervis ca. 5 + 7, molliter pubescentia subtus praecipue; petiolo 5 + 1 cm. longo glabrescente sub latere maiore alato. Spicae ca. 18 cm. longae 0.5 cm. crassae plus minusve nutantes; pedunculo 2–3 cm. longo. —COCLÉ: north rim of El Valle de Antón, Feb. 12, 1939, *A. H. G. Alston & P. H. Allen 1842* (Herb. Univ. Illinois, TYPE).

PIPER **alveatum** Trel., spec. nov. Frutex ramulosus ca. 2 m. altus; internodiis breviter hirsutis mox glabrescentibus. Folia anguste lanceolata longe attenuata basi oblique obtusa 10–

12 cm. longa 2–3 cm. lata sub medio pinnate impresso-nervata, nervis 4 + 5 subtus puberulis; petiolo 0.5 cm. longo. Spicae falcatae 6 cm. longae basi ca. 0.2 cm. diam. apiculatae; pedunculo 0.5–0.6 cm. longo.—BOCAS DEL TORO: vicinity of Nievecita, alt. ca. 0–50 m., Aug. 8–19, 1938, *Woodson, Allen & Seibert 1837* (Herb. Univ. Illinois, TYPE).

PIPER **amphibium** Trel., spec. nov. Frutex 2 m. altus, foliis supra glabrescentibus caeterumque puberulis; internodiis sat brevibus graciliusculisque. Folia lanceolata mucronate longeque attenuata basi inaequilateraliter acuta vel obtusa 5–16 cm. longa 3–10 cm. lata sub medio pinnate nervata, nervis utroque latere ca. 5 maturitate aliquid rufescentibus; petiolo 1 cm. longo ca. 0.1 cm. lato. Spicae 7–9 cm. longae basi ca. 0.5 cm. diam.; pedunculo 1.0–1.3 cm. longo.—COCLÉ: pools and their margins in wet llanos between Aguadulce and Antón, alt. ca. 15–50 m., July 12, 1938, *Woodson, Allen & Seibert 1222* (Herb. Univ. Illinois, TYPE).

PIPER **arctilimbum** Trel., spec. nov. Frutex nodosus ramosus; internodiis florigeris brevibus sat gracilibus ad tempus longe cinereo-velutinis. Folia anguste lanceolata gradatim acuta vel subacuminata basi obliqua latere longiore rotundata 1.2–1.4 cm. longa ca. 2 cm. lata sub medio pinnate nervata nervis fere horizontalibus utroque latere 5, subtus crasse velutina; petiolo vix 0.3 + 0.2 cm. longo velutino. Spicae ca. 6 cm. longae 0.3 cm., crassae submucronatae; pedunculo vix 1 cm. longo; bracteis subpeltato-triangularibus pallidis.—COCLÉ: vicinity of El Valle, *G. S. Miller 1813* (U. S. Nat. Herb., TYPE).

PIPER ARCTILIMBUM Trel., var. **Alleni** Trel., var. nov. A specie foliis maioribus (16 cm. longis 3 cm. latis), spicis arcuatis longioribus (7.5 cm. longis vel longioribus) differt.—COCLÉ: El Valle de Antón, alt. 600 m., *P. H. Allen 2003* (Herb. Univ. Illinois, TYPE).

PIPER **barbirostre** Trel., spec. nov. Arbusculus nodosus ca. 6 m. altus; internodiis superioribus brevibus sat crassis hirsutis. Folia ovato- vel subelliptico-lanceolata falcate longeque acuminata basi nonnihil inaequilateralia utroque latere obtusa 12–14 cm. longa 5–6 cm. lata sub medio pinnate nervata nervis

5 + 2, supra granulo-scabra subtus nervis ferrugineo-villosis post maturitatem rugescentia; petiolo ca. 0.5 + 0.2 cm. longo hirsuto. Spicae 8–9 cm. longae ca. 0.4 cm. crassae rostro sterili pubescente; pedunculo 0.5–1.0 cm. longo; bracteis rotundo-peltatis brunneis medio crustaceo fusco.—CHIRIQUÍ: vicinity of "New Switzerland," central valley of Río Chiriquí Viejo, Jan. 6–14, 1939, *P. H. Allen 1365* (Herb. Univ. Illinois, TYPE).

PIPER **bisacuminata** Trel., spec. nov. Herba terrestris vel lignicola glabra compacte ramosa altitudine mediocri. Caulis post exsiccationem 0.2–0.3 cm. crassus. Folia 3–4-nata rhombiformia apice obtuse acuminata basi late acuta 2.5–4.0 cm. longa 1.5 cm. lata 3-nervata post exsiccationem tenuia; petiolo vix 0.5 cm. longo. Spicae et terminales et axillares 5 cm. longae basi ca. 0.1 cm. diam.; pedunculo 1 cm. longo.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, alt. ca. 1500–2000 m., June 28–July 2, 1938, *Woodson, Allen & Seibert 971* (Herb. Univ. Illinois, TYPE).

PIPER **casitense** Trel., spec. nov. Frutex 1–2 m. altus; internodiis superioribus brevibus crassiusculis 3-angulatis hirtellis. Folia inaequilateraliter elliptico-oblanceolata acuminata basi acuta 17–20 cm. longa 5.5–7.5 cm. lata sub medio pinnate nervata, nervis utroque latere ca. 6 subtus distinctissime manifestis aliquid hirsutis supra scabra; petiolo vix 1 cm. longo hispido. Spicae 8–10 cm. longae basi ca. 0.5 cm. diam. cuspidatae; pedunculo vix 0.5 cm. longo glabrato.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, alt. ca. 1500–2000 m., June 28–July 2, 1938, *Woodson, Allen & Seibert 978* (Herb. Univ. Illinois, TYPE).

PIPER **cerro-puntoense** Trel., spec. nov. Frutex ca. 2 m. altus; internodiis superioribus sat gracilibus brevibusque ad primum dense subvillosis. Folia subovato-elliptica anguste acuminata basi rotundata uno latere paulo longiore, 20 cm. longa 11 cm. lata sub tertio superiore pinnate nervata nervis 6 + 7, supra brevissime scabridula subtus nervis hirsutulis; petiolo 1.0 + 0.2 cm. longo. Spicae paulo arcuatae apiculatae 9 cm. longae ca. 0.4 cm. crassae; pedunculo 1.0–1.5 cm. longo hirtello.—CHIRIQUÍ: trail to Cerro Punta, Río Chiriquí Viejo valley, March 29, 1938, *G. White 52* (Herb. Univ. Illinois, TYPE).

PIPER **colon-insulae** Trel., spec. nov. Frutex 2 m. altus, foliis supra glabris caeterumque molliter pubescens; internodiis gracilibus mox elongatis. Folia elliptica breviter acuminata basi obscure inaequilateraliterque cordulata 14–16 cm. longa 6.5–7.5 cm. lata sub medio pinnate nervata, venis utroque latere 5; petiolo 0.8 cm. longo ca. 0.2 cm. lato. Spicae 2.5–3.0 cm. longae basi ca. 0.7 cm. diam. apiculatae; pedunculo 0.8 cm. longo; baccis subquadratis, stylo brevissimo persistente.—BOCAS DEL TORO: Isla de Colon, alt. ca. 25–75 m., Aug. 17–18, 1938, *Woodson, Allen & Seibert 1934* (Herb. Missouri Bot. Gard., TYPE).

PIPER **conversum** Trel., spec. nov. Frutex subarborescens glaber ca. 2 m. altus; internodiis brevibus gracillimis. Folia elliptico-lanceolata anguste caudata basi acuta uno latere paulo breviore 4–11 cm. longa 3–8 cm. lata 5-nervata nervis exterioribus 2 marginalibus leviter undulatis; petiolo vix 0.3 + 0.2 cm. longo. Spicae solitariae laterales (nostrae immaturae). —CHIRIQUÍ: Llanos del Volcán, alt. 1300 m., Jan. 23, 1939, *P. H. Allen 1550* (Herb. Univ. Illinois, TYPE).

PIPER **cricamolense** Trel., spec. nov. Frutex fragilis 2–3 m. altus glaber vel mox glabrescens foliorum nervis subtus aliquid appresse arachnoideis exceptis; internodiis brevibus graciliusculis. Folia elliptica acute acuminata basi subaequilateraliter obtusa 13 cm. longa 7 cm. lata sub medio submultiplicate nervata, nervis utroque latere 4 vel 5; petiolo 0.5 cm. longo. Spicae 5–7 cm. longae 0.2–0.3 cm. diam.; pedunculo 1 cm. long.—BOCAS DEL TORO: Río Cricamola between Finca St. Louis and Konkintoë, alt. ca. 10–50 m., Aug. 12–16, 1938, *Woodson, Allen & Seibert 1927* (Herb. Univ. Illinois, TYPE).

PIPER DIAZANUM Trel., var. **viae-kobeanae** Trel., var. nov. Frutex 2 m. altus; internodiis gracilibus breviusculis sparse pilosulis. Folia elliptica vel subovato-lanceolata gradatim acute acuminata basi inaequilateraliter subcordulata 14–16 cm. longa 5–8 cm. lata sub medio pinnate nervata, nervis subtilibus pallidis sparse molliterque pilosis; petiolo 1 cm. longo ca. 0.2 cm. lato dorso sparse molliterque pilosulo. Spicae 8 cm. longae ca. 0.2 cm. diam.; pedunculo 0.5 cm. longo piloso.—

CANAL ZONE: Fort Kobe road, July 22, 1938, *Woodson, Allen & Seibert 1412* (Herb. Univ. Illinois, TYPE).

PIPER **erubescentispica** Trel., spec. nov. Frutex 2 m. altus; internodiis breviusculis graciliusculisque evanide villosis. Folia juventate summe villosa elliptica acute acuminata oblique cordulata 10–14 cm. longa 4.0–6.5 cm. lata sub medio pinnate nervata supra albide bullata, nervis utroque latere 4 vel 5 subtus villosis; petiolo 0.5 cm. longo ca. 0.2 cm. lato juventate villosulo. Spicae saturate rubrae 3 cm. longae basi ca. 0.3 cm. diam.; pedunculo 0.5 cm. longo glabrescente.—BOCAS DEL TORO: vicinity of Nievecita, alt. ca. 0–50 m., Aug. 8–19, 1938, *Woodson, Allen & Seibert 1817* (Herb. Univ. Illinois, TYPE).

PIPER **fluvii-initii** Trel., spec. nov. Arbor monticola ca. 8 m. alta; internodiis graciliusculis breviusculusque ad primum subhirsutis. Folia elliptica acuminata basi fere aequilateraliter rotundata ca. 17 cm. longa 9 cm. lata sub medio pinnate nervata nervis maioribus ca. 6 + 5, venulis supra valde immersis, firmiter membranacea paululo illustria supra glabra subtus nervis subvillosis; petiolo 2 cm. longo. Spicae 8 cm. longae in fructu ca. 1 cm. crassae apiculatae; pedunculo crasso 2 cm. longo velutino; stigmate filiformi stylo aequilongo.—CHIRIQUÍ: trail from Cerro Punta to headwaters of Río Caldera, alt. 2250–2500 m., Jan. 14, 1939, *P. H. Allen 1445* (Herb. Univ. Illinois, TYPE).

PIPER FRIJOLESANUM Trel., var. **grandifolium** Trel., var. nov. Suffrutex ca. 3 m. altus ut videtur omnino glaber; internodiis petiolisque minute verrucosis. Folia elliptica ca. 40 cm. longa 25 cm. lata vix acuminata basi lobis impendentibus; petiolo 4–5 cm. longo. Spicae immaturae ca. 0.3 cm. crassae; pedunculo ca. 2 cm. longo.—COCLÉ: El Valle, alt. 600–1000 m., Dec. 8, 1938, *P. H. Allen 1193* (Herb. Univ. Illinois, TYPE).

PIPER GAMBOANUM Trel., var. **yapense** Trel., var. nov. Frutex ca. 2 m. altus; ramis subhirsutis vel hispidis. Folia ellipticosubovata superne sublanceolata ca. 10 cm. longa 3–4 cm. lata inferne usque 6 cm. lata rugosa supra granulo-scabra subtus nervis plus minusve hirsutis; petiolo vix 0.5 cm. longo. Spicae ca. 6 cm. longae 0.3 cm. crassae; pedunculo ca. 0.5 cm. longo.—DARIEN: vicinity of Yape, Oct. 4, 1938, *P. H. Allen 854* (Herb. Univ. Illinois, TYPE).

PIPER GATUNENSE Trel., var. **cocleanum** Trel., var. nov. Forma nodosa ca. 3 m. alta; foliis ca. 25 cm. longis 9–10 cm. latis basi acutis; spicis ca. 20 cm. longis 1 cm. crassis.—COCLÉ: north rim of El Valle de Antón, May 14, 1939, *P. H. Allen 1784* (Herb. Univ. Illinois, TYPE).

PIPER GATUNENSE Trel., var. **latum** Trel., var. nov. A var. *cocleano* foliis ca. 35 cm. longis 16 cm. latis basi obtusis, spicis 25 cm. longis vel longioribus differt.—COCLÉ: north rim of El Valle de Antón, May 14, 1939, *P. H. Allen 1808* (Herb. Univ. Illinois, TYPE).

PIPER **Gigas** Trel., spec. nov. Arbor 10 m. alta, trunco ca. 30 cm. diam., ramulis obscure puberulis. Folia ovata subacuta oblique cordata sino aliquid angusto 30–45 cm. longa 20–25 cm. lata sub quarto parte superiore pinnate nervata, nervis utroque latere ca. 7 subtus puberulis; petiolo 8 cm. longo alato. Spicae 30 cm. longae basi ca. 0.8 cm. diam.; pedunculo 5 cm. longo.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, alt. ca. 1500–2000 m., June 28–July 2, 1938, *Woodson, Allen & Seibert 846* (Herb. Univ. Illinois, TYPE).

Apparently the largest *Piper* thus far collected in North America, and nearly, if not quite, equalling the Colombian *P. Giaccomettoi* which is reported as 12 m. tall, with a trunk 20–40 cm. thick.

PIPER **heraldi** Trel., nom. nov.—*Artanthe Seemanniana* Miq. in Seem., Bot. Herald, 199. *pl. 39.* 1854, not *Piper Seemannianum* C. DC. in DC., Prodr. **16**[1]: 347. 1869; *Piper auritum* var. *Seemannianum* (Miq.) Trel., Contr. U. S. Nat. Herb. **26**: 40. 1927.

PIPER HERALDI Trel., var. **amplius** Trel., var. nov. Ab specie foliis longioribus (22–25 × 45–50 cm.) differt.—CHIRIQUÍ: Finca Lérida to Boquete, alt. ca. 1300–1700 m., July 8–10, 1938, *Woodson, Allen & Seibert 1095* (Herb. Univ. Illinois, TYPE).

Also referred here questionably is the following: BOCAS DEL TORO: vicinity of Nievecita, alt. 0–50 m., Aug. 8–19, 1938, *Woodson, Allen & Seibert 1813.*

PIPER HERALDI Trel., var. **cocleanum** Trel., var. nov. Herba ut dicitur immani magnitudine ca. 3 m. alta var. *ampliori* simi-

lis, foliis subtus magis constanter cinereo-velutinis excepta. Folia ca. 45 cm. longa 30 cm. lata; petiolo 8 + 2 cm. longo. Spicae ca. 20 cm. longae ca. 0.3 cm. crassae; pedunculo 6 cm. longo.—COCLÉ: El Valle, Dec. 8, 1938, *P. H. Allen 1192* (Herb. Univ. Illinois, TYPE).

PIPER **humorigaudens** Trel., spec. nov. Frutex ramosus nodosus glaber ca. 2 m. altus; internodiis superioribus brevibus gracillimis. Folia lanceolata subacuminata basi acuta 8–13 cm. longa 2.5–3.0 cm. lata 3-nervata; petiolo vix 0.5 cm. longo. Spicae 4–5 cm. longae ca. 0.3 cm. crassae; pedunculo filiformi 1.0–1.5 cm. longo; baccis depresse ellipsoideis, stigmate parvo sessili.—COCLÉ: north rim of El Valle de Antón, May 21, 1939, *P. H. Allen 1833* (Herb. Univ. Illinois, TYPE).

PIPER **insulicolum** Trel., spec. nov. Frutex nodosus 2–3 m. altus aliquid obscure puberulus. Folia lanceolata vel oblanceolata subacuminata basi rotundata vel inaequilateraliter cordulata 17 cm. longa 5.5 cm. lata sub medio pinnate nervata, nervis utroque latere 5 vel 6; petiolo 1 cm. longo ca. 0.2 cm. lato. Spicae 7–8 cm. longae 0.3–0.5 cm. diam.; pedunculo 1 cm. longo.—PANAMÁ: Isla Taboga, June 24, 1938, *Woodson, Allen & Seibert 1527* (Herb. Univ. Illinois, TYPE).

The young spikes are minute, pointed, and borne on strikingly refracted stalks.

PIPER **konkintoense** Trel., spec. nov. Frutex 2–3 m. altus; internodiis gracilibus breviusculis aliquid laxe pubescentibus maturitate glabrescentibus. Folia elliptica acute acuminata oblique cordulata 14–16 cm. longa 6–7 cm. lata sub medio pinnate nervata, nervis utroque latere 6–7 supra granulo-scabris subtus molliter pubescentibus; petiolo 0.8 cm. longo ca. 0.2 cm. lato pubescente. Spicae refractae 11 cm. longae basi ca. 0.3 cm. diam.; pedunculo 0.5 cm. longo scabro.—BOCAS DEL TORO: between Finca St. Louis and Konkintoë, alt. 10–50 m., Aug. 12–16, 1938, *Woodson, Allen & Seibert 1894* (Herb. Univ. Illinois, TYPE).

PIPER **Margaretae** Trel., spec. nov. Frutex vix 1.5 m. altus; internodiis superioribus sat gracilibus brevibus subretrorse hispidis scabrisque. Folia rotundo- vel subovato-elliptica

longi-acuminata basi inaequilateraliter acuta 8.5–15.0 cm. longa 5.5–11.0 cm. lata sub medio pinnate nervata nervis ca. 5 + 2, supra valde granulo-scabra subtus nervis molliter hirsutis; petiolo ca. 0.8 + 0.2 cm. longo hispidulo-hirsuto. Spicae ca. 9 cm. longae 0.5 cm. crassae cuspidatae; pedunculo 1 cm. longo hispido.—CHIRIQUÍ: island in upper Río Chiriquí Viejo, *P. White 158* (Herb. Univ. Illinois, TYPE).

PIPER **minute-scabiosum** Trel., spec. nov. Frutex ramosus nodosus ca. 3 m. altus; internodiis brevibus gracilibus distincte sed minute lepidotis. Folia lanceolato-elliptica vel anguste lanceolata acuminata vel caudata basi fere aequilateraliter acuta 9–13 cm. longa 3–4 cm. lata sub medio pinnate nervata nervis 4 + 5, supra minute papillata demum mature lepidota subtus nervis strigosis; petiolo 0.5 cm. longo. Spicae ca. 5 cm. longae ca. 0.2–0.3 cm. crassae rufidulae; pedunculo 1.0–1.5 cm. longo.—COCLÉ: north rim of El Valle de Antón, Feb. 12, 1939, *P. H. Allen 1639* (Herb. Univ. Illinois, TYPE).

PIPER MINUTE-SCABIOSUM Trel., var. **arborescens** Trel., var. nov. Frutex arborescens ca. 2.5 m. altus. Folia usque 15 cm. longa 4.5 cm. lata latere longiore obtusiusculo.—COCLÉ: El Valle, Dec. 8, 1938, *P. H. Allen 1185* (Herb. Univ. Illinois, TYPE).

PIPER **novae-helvetiae** Trel., spec. nov. Arbor glabra ca. 6 m. alta; internodiis graciliusculis. Folia ovata anguste acuminata basi subtruncate rotundata uno latere paulo breviore, 14–20 cm. longa 6–12 cm. lata sub medio multiplicate nervata nervis 4 + 5; petiolo 0.2–0.4 + 0.2 cm. longo haud alato. Spicae 7 cm. longae ca. 0.4 cm. crassae apiculatae zonate bracteatae; pedunculo 0.5 cm. longo.—CHIRIQUÍ: vicinity of "New Switzerland," Río Chiriquí Viejo valley, alt. 1800–2000 m., Jan. 6, 1939, *P. H. Allen 1359* (Herb. Univ. Illinois, TYPE); same data, *P. H. Allen 1416* (Herb. Univ. Illinois).

PIPER **partiticuspe** Trel., spec. nov. Suffrutex ca. 3 m. altus; internodiis graciliusculis elongatis in tempus crispe hirsutis. Folia rotundo-ovata falcatim angusteque acuminata basi inaequilateraliter cordata uno latere petiolo longiore, 20–35 cm. longa 15–22 cm. lata supra venoso-bullata cuspide quoque 2–4-

partito pilosulo in superficie minute granulo-scabridulo subtus nervis rigide subvillosis; petiolo 4 cm. longo subvilloso. Spicae ca. 15 cm. longae ca. 0.5 cm. crassae; pedunculo 2 cm. longo glabro.—COCLÉ: El Valle de Antón, Dec. 8, 1938, *P. H. Allen 1195* (Herb. Univ. Illinois, TYPE).

PIPER **paso-anchoense** Trel., spec. nov. Arbuscula ca. 2 m. alta ramosa glabra; internodiis superioribus gracilibus sat brevibus. Folia ovato-lanceolata vel lanceolata gradatim acuta basi subaequilateraliter acuta 9–13 cm. longa 4–5 cm. lata sub medio pinnate nervata nervis maioribus utroque latere ca. 3 sed nervo medio superne delicate composito; petiolo 0.5–1.0 cm. longo. Spicae 3.5 cm. longae ca. 0.2–0.3 cm. crassae obtusae; pedunculo 0.5 cm. longo.—CHIRIQUÍ: trail from Paso Ancho to Monte Lirio, upper valley of Río Chiriquí Viejo, Jan. 16, 1939, *P. H. Allen 1579* (Herb. Univ. Illinois, TYPE).

PIPER **perfugii** Trel., spec. nov. Frutex glaber ramulosus valde nodosus 1 m. altus; internodiis brevibus sursum gracilibus. Folia lanceolata longe acuteque acuminata basi late acuta 7–8 cm. longa 2.0–2.5 cm. lata sub medio pinnate nervata, nervis utroque latere 4; petiolo 0.5 cm. longo. Spicae 5 cm. longae basi ca. 0.3 cm. diam.; baccis conspicuis pallidis 3-angularibus.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, alt. ca. 1500–2000 m., June 28–July 2, 1938, *Woodson, Allen & Seibert 928* (Herb. Univ. Illinois, TYPE).

PIPER **Permari** Trel., spec. nov. Frutex graciliter ramosus glaber. Folia elliptica gradatim caudata basi fere aequilateraliter rotundata ca. 11 cm. longa 4.5 cm. lata per totam longitudinem pinnate nervata nervis pallidis utroque latere ca. 8 post exsiccationem fere auritis subtus fere albis; petiolo 0.5 cm. longo. Spicae ca. 2.5 cm. longae ca. 0.3 cm. crassae erectae; pedunculo 0.5 cm. longo; bracteis subpeltatis pallidis; ovario ovoideo acute attenuato, stigmatibus 3 basalibus.—BOCAS DEL TORO: upper Changuinola River, Feb., 1939, *J. H. Permar s.n.* (Herb. Missouri Bot. Gard., TYPE).

PIPER **peruligerum** Trel., spec. nov. Suffrutex parvus, ramulis et petiolis et foliis subtus juventate ferrugine subarachnoideo-villosis, internodiis brevibus graciliusculis. Folia

lanceolata longe attenuata oblique cordulata 13–14 cm. longa 4–5 cm. lata sub medio pinnate nervata, nervis ca. 5 + 3, lamina inter venulas aliquid saccata; petiolo 0.3 cm. longo ca. 0.2 cm. lato pubescente. Spicae 2.5 cm. longae; pedunculo 0.3 cm. longo; ovario cum stylo brevi.—BOCAS DEL TORO: Isla de Colon, alt. ca. 25–75 m., Aug. 17–18, 1938, *Woodson, Allen & Seibert 1939* (Herb. Missouri Bot. Gard., TYPE).

PIPER **pervicax** Trel., spec. nov. Frutex 2–3 m. altus; internodiis brevibus graciliusculisque hirsuto-scabris. Folia elliptica acuminata basi rotundata vel oblique subcordulata 19–20 cm. longa 8 cm. lata sub medio pinnate nervata supra subtusque granulo-scabra, nervis 6 + 5 laxe hirtellis; petiolo 1.2–2.5 cm. longo. Spicae 9.5 cm. longae basi ca. 0.5 cm. diam. cuspidatae; pedunculo 1.5 cm. longo.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, alt. ca. 1500–2000 m., June 28–July 2, 1938, *Woodson, Allen & Seibert 843* (Herb. Univ. Illinois, TYPE).

PIPER **pseudo-viridicaule** Trel., spec. nov. Frutex 2 m. altus; internodiis florigeris gracilibus elongatis retrorse scabridulis tandem glabrescentibus. Folia lanceolata vel elliptica apice acute acuminata basi inaequilateraliter rotundata vel uno latere obliquissime acuta 10–12 cm. longa 3–6 cm. lata post exsiccationem tenuissima supra saturate viridia minutissime albo-scabridula subtus pallidiora ibique aliquid rugosa nervis appresse-pubescentibus sub medio pinnate nervata, nervis utroque latere ca. 4; petiolo 1.0–1.5 cm. longo basi alato retrorse scabro-hispidulo. Spicae ignotae.—CANAL ZONE: Barro Colorado Island, Gatun Lake, *Standley 31288* (U. S. Nat. Herb. No. 1,215,870, TYPE).

PIPER PSEUDO-VIRIDICAULE Trel., var. **nievecitanum** Trel., var. nov. Ab specie foliis firmioribus, spicis 9.0 cm. longis basi ca. 0.3 cm. diam., pedunculo scabridulo 0.5 cm. longo differt.—BOCAS DEL TORO: vicinity of Nievecita, alt. 0–25 m., Aug. 8–19, 1938, *Woodson, Allen & Seibert 1829* (Herb. Univ. Illinois, TYPE).

PIPER **salamancanum** Trel., spec. nov. Subarbor 2–4 m. alta glabra; internodiis brevibus gracilibusque. Folia elliptico-

lanceolata obtuse subcaudato-acuminata basi late acuta 8–9 cm. longa 2.5–4.0 cm. lata sulcate 5-nervata valde venosa nitide viridia; petiolo 0.5 cm. longo. Spicae 4.0 cm. longae basi ca. 0.4 cm. diam.; pedunculo 0.7 cm. longo, baccis remotis aroideis.—CANAL ZONE: vicinity of Salamanca Hydrographic Station, Río Pequení, alt. ca. 80 m., July 28–29, 1938, *Woodson, Allen & Seibert 1590* (Herb. Univ. Illinois, TYPE).

PIPER SAN-JOSEANUM C. DC., var. **kobense** Trel., var. nov. Frutex vix 2 m. altus. Folia ovata vel subrhombo-ovata late cordata 17–20 cm. longa 13–16 cm. lata, venis supra puberulis subtus hirtellis; petiolo 3–5 cm. longo. Spicae 7 cm. longae basi ca. 0.3 cm. diam.; pedunculo nigrescente 0.5 cm. longo.—CANAL ZONE: Fort Kobe road, July 22, 1938, *Woodson, Allen & Seibert 1423* (Herb. Univ. Illinois, TYPE).

PIPER SAN-JOSEANUM C. DC., var. **panamanum** Trel., var. nov. Frutex glaber. Folia 15–19 cm. longa 10–12 cm. lata; petiolo 3–5 cm. longo. Spicae nutantes 15 cm. longae basi 0.2 cm. diam. vel maiores; pedunculo 0.5 cm. longo.—PANAMÁ: Gorgona Beach, Aug. 7, 1938, *Woodson, Allen & Seibert 1690* (Herb. Univ. Illinois, TYPE).

PIPER SAN-JOSEANUM C. DC., var. **remediosense** Trel., var. nov. Frutex glabrescens 2 m. altus. Folia subrotundo-ovata longiuscule acuminata late cordata 20 cm. longa 18 cm. lata 13-nervata nervo medio petiolum trajiciente venis supra obscure puberulis. Spicae fere rectae 10 cm. longae basi ca. 0.2 cm. diam.; pedunculo 0.5 cm. longo.—CHIRIQUÍ: Río Chiriquí to Remedios, alt. ca. 15–50 m., July 11, 1938, *Woodson, Allen & Seibert 1191* (Herb. Univ. Illinois, TYPE).

PIPER SAN-JOSEANUM C. DC., var. **tabogense** Trel., var. nov. Frutex vix 2 m. altus gracilis glaber vel foliis subtus petiolisque sparse brevissimeque pilosulis. Folia rotundo-ovata fere subcaudato-acuminata ca. 14 cm. longa 10 cm. lata; petiolo 5–7 cm. longo. Spicae 5 cm. longae basi ca. 0.2 cm. diam.; pedunculo brevissimo.—PANAMÁ: Isla Taboga, alt. 0–186 m., July 23–24, 1938, *Woodson, Allen & Seibert 1531* (Herb. Univ. Illinois, TYPE).

PIPER **seducentifolium** Trel., spec. nov. Frutex glaber

nodosus 2 m. altus; internodiis brevibus graciliusculisque. Folia membranacea lanceolata vel subovata acuminata basi inaequilateraliter acuta vel fere aequilateraliter subtruncata 13 cm. longa 4.5–5.0 cm. lata prorsus pinnate nervata; petiolo 5–15 cm. longo per totam longitudinem alato. Spicae 5 cm. longae basi ca. 0.3 cm. diam.; pedunculo 1 cm. longo.—PANAMÁ: forest near Arraijan, June 22, 1938, *Woodson, Allen & Seibert 781* (Herb. Univ. Illinois, TYPE).

PIPER **tabernillanum** Trel., spec. nov. Frutex 1.5–3.0 cm. altus; internodiis florigeris elongatis gracilibus temporarie sparse molliterque pubescentibus. Folia elliptico-lanceolata acuminata basi aliquid inaequilateraliter cordulata vel subauriculata 14–17 cm. longa 4.5–6.5 cm. lata sub medio pinnate nervata, nervis utroque latere 4 vel 5 aliquid puberulis; petiolo vix 1 cm. longo ca. 0.2 cm. lato haud alato aliquid hirsuto-villoso. Spicae 8–9 cm. longae ca. 0.2–0.3 cm. crassae; pedunculo 0.5–1.5 cm. longo. Baccae obtrigonae.—CANAL ZONE: Tabernilla, *Pittier 3828* (U. S. Nat. Herb., TYPE).

PIPER TABERNILLANUM Trel., var. **anconense** Trel., var. nov. Frutex 2–3 m. altus, ramulis dense minuteque hirtellis. Folia supra hispidula subtus subvelutina. Spicae 5–6 cm. longae basi ca. 0.4 cm. diam; pedunculo 1 cm. longo.—CANAL ZONE: western slope of Ancón Hill, July 20, 1938, *Woodson, Allen & Seibert 1327* (Herb. Univ. Illinois, TYPE).

PIPER **tardans** Trel., spec. nov. Arbor parva 2–3 m. alta, trunco ca. 3 cm. diam., ramulis foliorum nervisque subtus puberulo-tomentulosis. Folia aliquid 5-gono-ovata subacuta basi late sed haud profunde cordata 28 cm. longa 15 cm. lata sub tertio superiore pinnate nervata, venis utroque latere 6; petiolo 5 cm. longo per totam longitudinem alato. Spicae 20 cm. longae basi ca. 0.5 cm. diam.; pedunculo 4 cm. longo.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, alt. ca. 1500–2000 m., June 28–July 2, 1938, *Woodson, Allen & Seibert 848* (Herb. Univ. Illinois, TYPE).

PIPER TUBERCULATUM Jacq., var. **Alleni** Trel., var. nov. Arbuscula ca. 4 m. alta; a specie foliis elliptico-ovatis vel sublanceolatis sat anguste acuminatis ca. 15 cm. longis 7 cm. latis, spicis

ca. 12.5 cm. longis 0.2–0.5 cm. crassis cuspidatis, pedunculo 1 cm. longo differt.—COCLÉ: vicinity of El Valle de Antón, Feb. 12, 1939, *P. H. Allen 1640* (Herb. Univ. Illinois, TYPE).

PIPER **varium** Trel., spec. nov. Suffrutex caespitosus nodosus ca. 3 m. altus; internodiis superioribus brevibus sat gracilibus. Folia orbiculata breviter acuminata oblique cordata vel subauriculata ca. 17 cm. diam. sub medio submultiplicate nervata nervis ca. 6 + 7, post exsiccationem tenuia supra minute obscureque punctata; petiolo ca. 4 cm. longo sub medio anguste alato. Spicae ca. 16 cm. longae ca. 0.5 cm. crassae; pedunculo sat crasso 2 cm. longo.—CHIRIQUÍ: trail from Paso Ancho to Monte Lirio, alt. 1500–2000 m., Jan. 16, 1939, *P. H. Allen 1491* (Herb. Univ. Illinois, TYPE).

PIPER **Whiteae** Trel., spec. nov. Frutex 3–4 m. altus glaber; internodiis superioribus gracilibus. Folia subovata ut videntur auriculata sinu laterali ca. 20 cm. longa 13 cm. lata sub medio pinnate nervata nervis ca. 6 + 7; petiolo ca. 3 cm. longo alato. Spicae ca. 30 cm. longae 1.5 cm. crassae; pedunculo gracili 1.5 cm. longo.—CHIRIQUÍ: valley of the upper Río Chiriquí Viejo, near El Volcán, *P. White 177* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **albescens** Trel., spec. nov. Epiphyta subsucculenta repente subcaespitosa obscure pilosa ciliata. Folia 2–3-natave late elliptica apice basique obtusa vel subacuta 0.5–0.8 cm. longa 0.5 cm. lata post exsiccationem albescentia crassa coriacea haud manifeste nervata; petiolo 0.2–0.3 cm. longo. Spicae affixae plus minusve curvatae 1.0–1.5 cm. longae ca. 0.2 cm. diam.; pedunculo filiformi 1 cm. longo; bracteis rotundato-peltatis.—COCLÉ: vicinity of El Valle, alt. ca. 600–1000 m., Dec. 8, 1938, *P. H. Allen 1259* (Herb. Univ. Illinois, TYPE).

PEPEROMIA ANTONI Trel., var. **reducta** Trel., var. nov. Forma nana; foliis obovato-subspathulatis obtusis vel emarginatis subtus pallidioribus vix 5 cm. longis 3 cm. latis; spicis solitariis fructu vix 9 cm. longo.—COCLÉ: vicinity of El Valle, Dec. 8, 1938, *P. H. Allen 1222* (Herb. Univ. Illinois, TYPE).

PEPEROMIA ANTONI Trel., forma **fertilior** Trel., f. nov. Forma robusta; 3 spicis superioribus 12.0 cm. longis 0.3 cm. diam.;

pedicellis 3 cm. longis; pedunculo 4 cm. longo.—COCLÉ: vicinity of El Valle, Sept. 5, 1938, *P. H. Allen 760* (Herb. Univ. Illinois, TYPE).

PEPEROMIA ANTONI Trel., forma **lutea** Trel., f. nov., internodiis brevibus; foliis elliptico-obovatis subacutis vel obtusis 8–9 cm. longis 4–5 cm. latis; petiolo 2 cm. longo; spicis solitariis.—COCLÉ: vicinity of El Valle, Dec. 8, 1938, *P. H. Allen 1160* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **Appellator** Trel., spec. nov. Herba parva repento-assurgens glabra epiphytica. Caulis post exsiccationem ca. 0.1–0.2 cm. crassus porriginoso-exfolians. Folia alternata subrhombo-ovata vel elliptica apice basique acuta vel subacuta 1.5–2.0 cm. longa 0.5–1.5 cm. lata 3-nervata post exsiccationem subcoriacea; petiolo 0.5 cm. longo. Spicae terminales 3.5 cm. longae basi ca. 0.2 cm. diam.; pedunculo 1 cm. longo.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, alt. ca. 1500–2000 m., June 28–July 2, 1938, *Woodson Allen & Seibert 816* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **bifrons** Trel., spec. nov. Herba mediocris simplex erecta maturitate fere glabra. Caulis post exsiccationem 0.3–0.4 cm. crassus sulcatus, internodiis breviusculis. Folia 3–4-nata oblongo-lanceolata apice obtusa vel minutissime retusa basi anguste cuneata inaequilateraliter acuta 2.0–2.5 cm. longa 0.5 cm. lata obscure 3-nervata apicem versus minute ciliata; petiolo vix 0.3 cm. longo. Spicae terminales vel subterminales 3.5 cm. longae basi ca. 0.2 cm. diam.; pedunculo crassiusculo 1.0–1.5 cm. longo.—CHIRIQUÍ: Finca Lérida to Boquete, alt. ca. 1300–1700 m., July 8–10, 1938, *Woodson, Allen & Seibert 1132* (Herb. Missouri Bot. Gard., TYPE).

The young plants have sparsely villous stems and obovate-elliptic to subspatulate leaves 1.0–1.5 cm. long and 0.5 cm. broad, not at all resembling the adult form.

PEPEROMIA **bocasensis** Trel., spec. nov. Herba epiphytica mediocris erubescens aliquid hispidula. Caulis repento-assurgens post exsiccationem sulcatus ca. 0.2 cm. crassus. Folia 3–4-nata elliptica apice basique subobtusa 3-nervata hispidulo-ciliata post exsiccationem coriacea illustria; petiolo 0.2–0.3 cm.

longo. Spicae terminales filiformes 7–10 cm. longae, pedunculo longitudine dimidio.—BOCAS DEL TORO: vicinity of Nievecita, alt. ca. 0–50 m., Aug. 8–19, 1938, *Woodson, Allen & Seibert 1859* (Herb. Univ. Illinois, TYPE).

PEPEROMIA BREVIPEDUNCULA (C. DC.) Trel., var. **major** Trel., var. nov. Forma foliis rotundato-ovatis 9 cm. longitudine 7 cm. latitudine attingentibus, juventate minoribus ovatis vel reniformibus 3.0–5.0 cm. longis 3.5–4.5 cm. latis; petiolo gracili 5–10 cm. longo, caule pro portione gracili.—PANAMÁ: cherty rocks, Río Las Lajas, Feb., 1940, *P. H. Allen 2037* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **casitana** Trel., spec. nov. Herba epiphytica glabra majuscula. Caulis repento-assurgens paucifoliosus, internodiis brevibus post exsiccationem, ca. 0.5 cm. crassus. Folia alternata subovato-lanceolata acuminata cuneata 15–17 cm. longa 6–7 cm. lata pinnate nervata; petiolo 2–3 cm. longo canaliculato. Spicae sympodialiter terminales 12 cm. longae basi ca. 0.5 cm. diam.; pedunculo 2 cm. longo; baccis ellipsoideis scutulatis.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, alt. ca. 1500–2000 m., June 28–July 2, 1938, *Woodson, Allen & Seibert 952* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **cerro-puntana** Trel., spec. nov. Epiphyta montana magna sed tenuia; internodiis inferioribus radices gerentibus, superioribus vix 0.3 cm. crassis. Folia alternata rotundo-ovata anguste acuminata peltata 6.0–7.5 cm. longa 4–5 cm. lata 5-nervata post exsiccationem membranacea; petiolo gracili 5 cm. longo amplexicauli. Spicae sympodiales 7 cm. longae ca. 0.3 cm. diam.; pedunculo 2.5 cm. longo; bracteis rotundo-peltatis.—CHIRIQUÍ: trail from Cerro Punta to headwaters of Río Caldera, alt. 2250–2500 m., Jan. 14, 1939, *P. H. Allen 1451* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **chiqueroana** Trel., spec. nov. Herba majuscula laxe ramosa erecta glabra. Caulis post exsiccationem nigrescens ca. 0.1–0.3 cm. crassus. Folia 3–4-nata lanceolata apice basique acuta 5–6 cm. longa 1.5–2.0 cm. lata 3-nervata post exsiccationem tenuia; petiolo 0.5 cm. longo. Spicae terminales vel subterminales filiformes ca. 5 cm. longae; pedunculo 0.5–

1.0 cm. longo.—CHIRIQUÍ: Bajo Mona, mouth of Quebrada Chiquero, Río Caldera, alt. 1500–2000 m., July 3, 1938, *Woodson, Allen & Seibert 1025* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **cruentata** Trel., spec. nov. Herba parva repens epiphytica sparse minuteque hirsuta. Caulis filiformis. Folia alternata rotundo-obovata superne subacute lanceolata vix 0.7 cm. diam.; petiolo 0.2 cm. longo. Spicae 3–4 cm. longae basi ca. 0.1 cm. diam. rubrae vel virides ramulos breves erectos 1–3-foliatos terminantes; pedunculo 0.5 cm. longo.—BOCAS DEL TORO: Isla de Colon, alt. ca. 25–75 m., Aug. 17–18, 1938, *Woodson, Allen & Seibert 1938, 1941* (Herb. Missouri Bot. Gard., TYPE).

PEPEROMIA **digitinervia** Trel., spec. nov. Epiphyta glabra repentia; ramis 0.1–0.2 cm. crassis, nodis saepe radices gerentibus. Folia alternata ovata acuta basi subtruncata 2.5–4.0 cm. longa 2–3 cm. lata coriacea 5-nervata subtus pallidiora; petiolis 2–3 cm. longis gracilibus. Spicae 4 cm. longae 0.2 cm. diam.; pedunculo 2 cm. longo; baccis oblongoideis anguste rostratis, stigmate anteriore ad basem rostri.—COCLÉ: vicinity of El Valle, Dec. 8, 1938, *P. H. Allen 1221* (Herb. Missouri Bot. Gard., TYPE).

PEPEROMIA **diruptorum** Trel., spec. nov. Herba erecta simplex mediocris glabra. Caulis post exsiccationem ca. 0.2 cm. crassus. Folia alternata obovato-lanceolata superiora acuta inferiora valde obtusa omnia basi late acuta 2–4 cm. longa 1–2 cm. lata 5-nervata subtus olivacea nervis lateralibus exterioribus basi confluentibus; petiolo filiformi 0.5–1.0 cm. longo. Spicae terminales juventate 2 cm. longae basi ca. 0.2 cm. diam.; pedunculo 0.5–1.0 cm. longo.—CHIRIQUÍ: Bajo Mona, mouth of Quebrada Chiquero, along Río Caldera, alt. ca. 1500–2000 m., July 3, 1938, *Woodson, Allen & Seibert 1023* (Herb. Missouri Bot. Gard., TYPE).

PEPEROMIA **duricaulis** Trel., spec. nov. Epiphyta montanae glabra foliosa erecta; ramis ca. 1 m. altis 0.5 cm. crassis basi lignosis. Folia alternata elliptico-oblanceolata anguste acuminata basi cuneata 10–12 cm. longa 0.4–0.5 cm. lata pinnate nervata post exsiccationem crasse chartacea; petiolo toto alato.

Inflorescentia lateralis paniculata divaricata ampla. Spicae ca. 6 filiformes 3–5 cm. longae; pedunculo gracili 3 cm. longo.—CHIRIQUÍ: trail from Cerro Punta to headwaters of Río Caldera, alt. 2250–2500 m., Jan. 14, 1939, *P. H. Allen 1441* (Herb. Univ. Illinois, TYPE).

PEPEROMIA (?) **insueta** Trel., spec. nov. Herba mediocris acaulis terrestris omnino plus minusve molliter pubescens. Folia elliptica apice basique obtusa 3–6 cm. longa 2–4 cm. lata multiplicate nervata nervis 4 basalibus alio paulo super basem alio prope apicem; petiolo gracili 5–8 cm. longo. Spicae plures inter folia 4–5 cm. longae ca. 0.2 cm. diam.; pedunculo subaequali; bracteis rotundo-peltatis.—COCLÉ: vicinity of El Valle, Dec. 8, 1938, *P. H. Allen 1220* (Herb. Missouri Bot. Gard., TYPE).

PEPEROMIA **laesa** Trel., spec. nov. Epiphyta mediocria simplicia erecta glabra; ramis ca. 0.2 cm. crassis. Folia saepissime 3-nata elliptico-subrhombica vel lanceolata obtuse subacuminata basi acuta 2.0–2.5 cm. longa 1.0–1.5 cm. lata obscure 3-nervata post exsiccationem opaca subtus subflava; petiolo 0.5 cm. longo gracili. Spicae axillares superne aggregatae 1.5–2.0 cm. longae 0.2 cm. crassae; pedunculo 0.5 cm. longo.—CHIRIQUÍ: vicinity of "New Switzerland," central valley of Río Chiriquí Viejo, alt. 1800–2000 m., Jan. 14, 1939, *P. H. Allen 1422* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **leridana** Trel., spec. nov. Herba epiphytica mediocris repens glabra. Caulis superne gracilis inferne post exsiccationem ca. 0.5 cm. crassus. Folia alternata elliptico-lanceolata vel elliptica breviter acuminata cordulata 10–12 cm. longa 5–7 cm. lata tenuiter pinnate nervata post exsiccationem coriacea subtus lutescentia; petiolo aequilongo. Spicae 1 vel 2 ramulos brevissimos sympodiales terminantes 15 cm. longae basi ca. 0.3 cm. diam.; pedunculo 5 cm. longo.—CHIRIQUÍ: Finca Lérida to Boquete, alt. 1300–1700 m., July 8–10, 1938, *Woodson, Allen & Seibert 1176* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **lopezensis** Trel., spec. nov. Herba terrestris sat magna rhizomatigera brevicaulis paucifolia glabra. Folia alternata elongato-lanceolata vel oblanceolata acuta cuneata

20–28 cm. longa 4.0–5.5 cm. lata tenuiter pinnate nervata nervo medio prominente; petiolo perbrevi. Spicae paniculatae ca. 0.5 cm. longae ca. 0.1 cm. crassae; pedunculo primario filiformi subterminali 6–7 cm. longo secundariis 0.3–0.5 cm. longis.—CANAL ZONE: Quebrada Lopez, Feb. 11, 1940, *P. H. Allen 2118* (Herb. Missouri Bot. Gard., TYPE).

PEPEROMIA **nievecitana** Trel., spec. nov. Herba parva epiphytica implicate repento-assurgens. Caulis tenuis post exsiccationem vix 0.1 cm. diam. minute hirtellus. Folia alternata oblongo- vel subovato-elliptica apice obtusa basi subacuta ca. 0.8 cm. longa 0.3 cm. lata opaca minutissime hirtella mox ciliato-glabrescentia; petiolo 0.1 cm. longo. Spicae terminales 2–3 cm. longae basi ca. 0.1 cm. diam.; pedunculo filiformi.—BOCAS DEL TORO: vicinity of Nievecita, alt. ca. 0–50 m., Aug. 8–19, 1938, *Woodson, Allen & Seibert 1865* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **novae-helvetiae** Trel., spec. nov. Epiphyta mediocria repento-assurgentia glabra; ramis basi ca. 0.4 cm. crassis, ramulis frondosis gracilioribus. Folia alternata elliptica obtusa superne rhombo-subobovata obtuseque acuminata 4.0–5.5 cm. longa 2.5–3.5 cm. lata 5-nervata post exsiccationem plus minusve pellucida; petiolis 1.0–1.5 cm. longis amplexicaulibus. Spicae terminales 2 cm. longae ca. 0.2 cm. crassae; pedunculo 1 cm. longo.—CHIRIQUÍ: vicinity of "New Switzerland," central valley of Río Chiriquí Viejo, alt. 1800–2000 m., Jan. 14, 1939, *P. H. Allen 1417* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **rivi-vetusti** Trel., spec. nov. Epiphyta mediocria stolonifera vel repento-assurgentia glabra; ramis 0.2–0.3 cm. crassis. Folia alternata sed superiora subverticillate aggregata elliptica apice basique acuta vel subacuminata 4–6 cm. longa 2.5–3.0 cm. lata 3- vel 5-nervata post exsiccationem pellucida fuscentiaque; petiolis 0.5–1.0 cm. longis gracilibus. Spicae terminales 4–5 cm. longae ca. 0.3 cm. crassae; pedunculo 1 cm. longo.—CHIRIQUÍ: vicinity of "New Switzerland," central valley of Río Chiriquí Viejo, Jan. 14, 1939, *P. H. Allen 1360* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **sarcodes** Trel., spec. nov. Epiphyta monticola valida simplicia erecta carnosa; ramis plusquam 0.5 cm. crassis

dense cicatricosis superne frondosis. Folia pauca oblongo-oblanceolata acuminata longe cuneata 15–16 cm. longa ca. 4 cm. lata pinnate nervata post exsiccationem tenuia translucescentia; petiolo 2 cm. longo. Spicae solitariae terminales 5–20 cm. longae ca. 0.3 cm. crassae; pedunculo ca. 1 cm. longo.—CHIRIQUÍ: trail from Cerro Punta to headwaters of the Río Caldera, alt. 2250–2500 m., Jan. 14, 1939, *P. H. Allen 1452* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **Simulatio** Trel., spec. nov. Herba epiphytica mediocris procumbens ad nodos radicans glabra. Caulis post exsiccationem vix 0.2 cm. crassus. Folia alternata 2 summis exceptis elliptica apice basique acuta inferne obovata apice obtuse acuminata 1.5–3.5 cm. longa 1–2 cm. lata obscure 3-nervia opaca supra stellate pallido-maculata subtus lutescentia; petiolo gracili 0.5–1.0 cm. longo basi implexo. Spicae terminales 4 cm. longae basi ca. 0.2 cm. diam.; pedunculo 1 cm. longo.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, alt. ca. 1500–2000 m., June 28–July 2, 1938, *Woodson, Allen & Seibert 895* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **tenebraegaudens** Trel., spec. nov. Herba epiphytica mediocris. Caulis repento-assurgens gracilis inferne post exsiccationem ca. 0.5 cm. crassus paucifoliatus. Folia alternata rotundo-ovata breviter acuminata super basim breviter peltata ca. 14 cm. longa 10 cm. lata tenuiter pinnate nervata post exsiccationem opaque coriacea; petiolo gracili aequilongo. Spicae 1 vel 2 ramulos breves sympodiales terminantes 7 cm. longae; pedunculo 3 cm. longo.—CHIRIQUÍ: dark wet forest, Bajo Mona, mouth of Quebrada Chiquero, along Río Caldera, alt. ca. 1500–2000 m., July 3, 1938, *Woodson, Allen & Seibert 993* (Herb. Univ. Illinois, TYPE).

PEPEROMIA **Woodsonii** Trel., spec. nov. Herba parva terrestris ramosiuscula glabra *P. hispidulae* similis. Folia alternata rhombo-ovata apice basique acutiuscula pinnate nervata; petiolo 0.5–0.7 rariusve 1.0 cm. longo. Spicae terminales graciles laxae vix 1 cm. longae; pedunculo aequilongo; baccis ellipsoideis pseudopedicello gracili, stigmate gracili stipitato.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiri-

quí, alt. 1500–2000 m., June 28–July 2, 1938, *Woodson, Allen & Seibert 933* (Herb. Univ. Illinois, TYPE).

POTHOMORPHE **Alleni** Trel., spec. nov. Frutex 2 m. altus glabrus foliis exceptis; internodiis sat crassis elongatis. Folia subreniformia deltoidea acuminata late cordata sinu apertissimo ca. 23 cm. diam. subtus nervis nervulisque cinereo-puberulis, petiolo gracili 20 cm. longo apicem versus angustissime alato. Umbellae 2, ca. 5-spicatae; pedunculo 2 cm. longo; pedicellis 10 cm. longis. Spicae 3–7 cm. longae ca. 0.3 cm. diam.—COCLÉ: vicinity of El Valle, alt. 600–1000 m., Dec. 8, 1938, *P. H. Allen 1190* (Herb. Missouri Bot. Gard., TYPE).

POTHOMORPHE **almirantensis** Trel., spec. nov. Frutex glaber. Folia peltata rotundata deltoideo-acuminata basi subretusa ca. 25 cm. diam.; petiolo subaequilongo vix alato. Umbella solitaria ca. 12-spicata; pedunculo 4 cm. longo; pedicellis 1.0–1.5 cm. longis. Spicae 9–10 cm. longae ca. 0.3 cm. crassae.—BOCAS DEL TORO: Farm One, Almirante, *Cooper 170* (Herb. Field Mus., TYPE).

POTHOMORPHE **Baileyorum** Trel., spec. nov. Frutex glaber; internodiis brevibus lentis crassiusculis. Folia peltata rotundata basi retusa ca. 30 cm. diam.; petiolo vix aequilongo apicem versus gradatim anguste alato. Umbella solitaria ca. 7-spicata; pedunculo 7 cm. longo; pedicellis maturitate 1.0–1.5 cm. longis. Spicae 8–9 cm. longae ca. 0.2 cm. crassae.—CANAL ZONE: Barro Colorado Island, *L. H. & Ethel Zoe Bailey 414* (Herb. Univ. Illinois, TYPE).

POTHOMORPHE BAILEYORUM Trel., var. **paucispica** Trel., var. nov. Frutex graciliter ramosus. Folia 30 cm. diam. Umbella graciliter pedunculata vix 5-spicata.—CANAL ZONE: Salamanca Hydrographic Station, Río Pequeni, alt. 80 m., July 28, 1938, *Woodson, Allen & Seibert 1573* (Herb. Univ. Illinois, TYPE).

POTHOMORPHE **tecumensis** Trel., spec. nov. Frutex glaber ut videtur gracilis vix 2 m. altus. Folia peltata ovata acuminata basi retuse cordata ca. 22 cm. longa 20 cm. lata subtus pubescentia; petiolo aliquid breviore apicem versus alato. Umbella solitaria ca. 10-spicata; pedunculo 2.5 cm. longo; pedicellis 1.5 cm. longis. Spicae 10 cm. longae ca. 0.2 cm. crassae.—CANAL ZONE: Tecumen, *Standley 26735* (U. S. Nat. Herb., TYPE).

POTHOMORPHE TECUMENSIS Trel., var. **grandis** Trel., var. nov. Frutex molliter lignosus 1–2 m. altus, ab specie foliis grandibus 30 m. diam. differt.—PANAMÁ: vicinity of Arraijan, alt. ca. 15 m., July 21, 1938, *Woodson, Allen & Seibert 1398* (Herb. Univ. Illinois, TYPE).

LORANTHACEAE

*(Phoradendron by W. Trelease, Urbana, Ill.)*

PHORADENDRON **Allenii** Trel., spec. nov. *(Aequatoriales-Brevifoliae).* Rami simplices vel parum compositi subelongati cataphyllis inferioribus tantum; internodiis mediocribus 3–4 cm. longis 0.2–0.4 cm. crassis teretibus sed nodis paululo compressis; cataphyllis geminis inferioribus. Folia late elliptica lateque obtusa 4–5 cm. longa 2.5–3.0 cm. lata basi usque 1 cm. acute subpetiolata. Spicae aggregatae 1.5–2.0 cm. longae ca. 0.4 cm. crassae articulis ca. 3 subellipticis 4 + 2- vel 6-seriatum ca. 20-floris; pedunculo fere obsoleto; baccis maturis ignotis.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, alt. ca. 1500–2000 m., June 28–July 2, 1938, *Woodson, Allen & Seibert 792* (Herb. Univ. Illinois, TYPE).

PHORADENDRON **herrerense** Trel., spec. nov. *(Aequatoriales-Quadrangulares).* Ramuli graciles 4-angulati valde divaricati glabri cuiusque nodo basali solum cataphyllas 2 gerente. Folia elliptica vel oblongo-elliptica apice obtusa basi acute cuneata 3.5–4.5 cm. longa 1.0–1.5 cm. lata ca. 5-nervata. Spicae solitariae laterales ca. 4 cm. longae articulis saepissime 5, 4 + 2-seriatim 12-floris; pedunculo aequilongo nudo; baccis rotundatis ca. 0.3 cm. diam. luteis, sepalis inflexis.—HERRERA: Pesé, alt. ca. 50 m., Sept. 13, 1938, *P. H. Allen 798* (Herb. Univ. Illinois, TYPE).

PHORADENDRON **novae-helvetiae** Trel., spec. nov. *(Aequatoriales-Corynarthrae).* Fruticulus epiphyticus aspectu *P. corynarthro* similis. Rami inferne furcati, ramulis sat longis gracilibusque basi cataphyllas 2 gerentibus striatis superne ancipitibus inferne teretibus; internodiis 8–9 cm. longis vel minoribus. Folia lineari-lanceolata apice basique acuta 8–10 cm. longa 0.5–1.0 cm. lata cuneate subsessilia tenuia sed opaca sat distincte 5-nervata. Spicae laterales plerumque aggregatae rubrae (?) 1–4 cm. longae apiculatae, articulis ca. 4

clavatis, floribus ca. 12, 4-seriatim positis, pedunculo brevissimo; baccis glabris rotundatis 0.3 cm. diam., sepalis valde inflexis.—CHIRIQUÍ: vicinity of "New Switzerland," central valley of Río Chiriquí Viejo, alt. 1800–2000 m., Jan. 6–14, 1939, *P. H. Allen 1399* (Herb. Univ. Illinois, TYPE).

PHORADENDRON **pergranulatum** Trel., spec. nov. *(Aequatoriales-Percurrentes).* Epiphyta ut videntur maxima robusta; ramulis rugoso-granulatis cum foliis percurrentibus; internodiis teretibus basi cataphyllas 2 subtruncatas gerentibus. Folia elliptico-oblonga vel cultriformia late obtusa basi cuneate decurrentia 1.5–2.5 cm. lata 7–8 cm. longa opaca obscure 5-nervata. Spicae solitariae laterales ca. 3 cm. longae articulis 5, 4-seriatim 4-floris; pedunculo vix manifesto; baccis rotundatis ca. 0.5 cm. diam., sepalis erectis.—COCLÉ: vicinity of El Valle, alt. 800–1000 m., Sept. 5, 1938, *P. H. Allen 777* (Herb. Univ. Illinois, TYPE).

PHORADENDRON **sonanum** Trel., spec. nov. *(Aequatoriales-?Corynarthrae).* Rami vix furcati glabri superne 2–4-angulati; internodiis infimis cataphyllas 2 fere basales gerentibus. Folia oblonga acuta 5 cm. longa 1 cm. lata opaca fere 3-nervata basi cuneate subpetiolata. Spicae plerumque solitariae laterales 4–5 cm. longae articulis ca. 4 subcapitatis 4-seriatim 10-floris, pedunculo brevi, baccis rotundatis luteis, sepalis inflexis. —VERAGUAS: hills west of Soná, alt. ca. 500 m., Nov. 24, 1938, *P. H. Allen 1033* (Herb. Univ. Illinois, TYPE).

PHORADENDRON **Woodsonii** Trel., spec. nov. *(Aequatoriales-Panamanae*[1]). Rami subinde pseudodichotomi nodis omnibus cataphyllis munitis; internodiis graciliusculis 2–4 cm. longis 0.3–0.5 cm. crassis; cataphyllis geminis fere 2-divisis internodii dimidio parte inferiore ca. 4-seriatim positis. Folia elliptico-subovata apice basique acuta 3.5–5.5 cm. longa 1.5–2.5 cm. lata basi usque fere 0.5 cm. subpetiolata opaca basi obscure 3- vel 5-nervata. Spicae laterales solitariae usque 4 cm. longae 0.5 cm. latae articulis ca. 6 subclavatis androgynae 4 + 2-seri-

[1]PANAMANAE. Folia mediocria elliptico-subovata crassa, nervis pluribus inferioribus inconspicuis. Rami tereti, nodis omnibus cataphyllis munitis. Spicae breviusculae crassiusculaeque, floribus 4 + 2-seriatim positis. Baccae ovoideo-ellipsoideae laeves, sepalis connatis clausis.—Species 1 Isthmi Panamani.

atim ca. 12-floris; pedunculo vix 0.5 cm. longo nodis sterilibus basalibus ca. 1–2; baccis subovatis ca. 0.3 × 0.4 cm. subrubicundis, sepalis connatis.—COCLÉ: between Las Margaritas and El Valle, July 15, 1938, *Woodson, Allen & Seibert 1302* (Herb. Univ. Illinois, TYPE).

GAIADENDRON POASENSE Donn. Sm.—CHIRIQUÍ: vicinity of Cerro Punta, Jan. 21–24, 1939, *P. H. Allen 1518*. Previously known from Costa Rica.

PSITTACANTHUS **Allenii** Woodson & Schery, sp. nov. *(Eupsittacanthus-Ligulati)*. Frutex parasiticus omnino glaber; ramis ramulisque sat crassis teretibus ad nodos haud conspicue incrassatis continuis. Folia alternata vel approximata subsessilia obovato-elliptica apice rotundata vel obtusissima basi ca. e medio gradatim cuneata in petiolo decurrentia cum petiolo 4–7 cm. longa 2–3 cm. lata coriacea olivacea utrinque stomatifera penninervia, costa crassa utrinque elevata. Inflorescentia corymbosa 2–6-flora in axillis foliorum 2–4-fasciculata foliis ca. dimidia brevior. Flores bini aurantiaci; pedicello ca. 0.5 cm. longo; cupula patelliformi submembranacea margine integro ca. 0.2 cm. diam.; calyculo anguste campanulato ca. 0.3 cm. alto margine conspicue dilatato integro ca. 0.25 cm. diam. 0.07 cm. alto; perigonio gracili maturitate 3.5 cm. longo prope basim ca. 0.25 cm. diam., lobis 6 basi ligulatis margine minutissime hamulosis; filamentis inaequalibus 1.2–1.5 cm. longis prope medium perigonii adnatis, antheris dorsifixis oblongis 0.4 cm. longis minute apiculatis; stylo perigonium subaequante, stigmate capitato.—COCLÉ: vicinity of El Valle, alt. 600–1000 m., Dec. 8, 1938, *P. H. Allen 1223* (Herb. Missouri Bot. Gard., TYPE).

This interesting species appears to be closely related to *Ps. dilatatus* A. C. Smith, of Colombia, largely on the basis of the position of the inflorescence and expanded margin of the calyculus. The latter species, however, is somewhat larger in all respects, and the margin of the calyculus conspicuously and regularly crenulate.

PSITTACANTHUS **lateriflorus** Woodson & Schery, sp. nov. *(Eupsittacanthus-Ligulati)*. Frutex parasiticus omnino glaber; ramis ramulisque sat crassis teretibus ad nodos haud con-

spicue incrassatis continuis. Folia alternata approximata vel subopposita subsessilia anguste oblongo-elliptica apice rotundata vel obtusissima basi ca. e medio gradatim cuneata in petiolo decurrentia cum petiolo 4–7 cm. longa 1.5–2.5 cm. lata coriacea olivacea utrisque superficiebus stomatifera crassa, costa crassa utrinque elevata, nervi laterales penninervii et vix sensi. Inflorescentia corymbosa 2–4 flora in axillis foliorum plerumque 2-fasciculata foliis ca. dimidia brevior. Flores coccinei; pedicello ca. 0.4 cm. longo; cupula prorae simili submembranacea margine integro ca. 0.2 cm. longa 0.1 cm. lata; calyculo urceolato ca. 0.2 cm. alto margine integro haud conspicue dilatato; perigonio gracili maturitate 2.5 cm. longo prope basim ca. 0.13 cm. diam., lobis 6 basi vix ligulatis; filamentis invicem inaequalibus 0.7–1.2 cm. longis prope medium perigonii adnatis, antheris dorsifixis oblongis 0.3 cm. longis ad basim subcaudatis; stylo perigonium subaequante, stigmate capitato.—COCLÉ: vicinity of El Valle, alt. 600–1000 m., Sept. 17, 1939, *P. H. Allen 1979* (Herb. Missouri Bot. Gard., TYPE).

Closely related to *Ps. peronopetalus* Eichl., but readily distinguishable by the much smaller, cuneate leaves.

PSITTACANTHUS SCHIEDEANUS (Schlecht. & Cham.) Blume—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, June 28–July 2, 1938, *Woodson, Allen & Seibert 915;* Río Chiriquí Viejo Valley, April 10, 1938, *Gene White 76;* trail from Cerro Punta to headwaters of Río Caldera, Jan. 14, 1939, *P. H. Allen 1444.* This species previously has been known to occur from southern Mexico to Costa Rica. An isotype in the herbarium of the Missouri Botanical Garden has flowers somewhat smaller than ours, and other small details indicate that future segregation may be necessary.

## MENISPERMACEAE

*(P. C. Standley, Chicago)*

HYPERBAENA **Allenii** Standl., sp. nov. Arbor 8-metralis, ramulis subteretibus dense pilis brevibus sordidis subadpressis pilosis, internodiis brevibus; folia magna breviter petiolata subcoriacea, petiolo 1.5–2 cm. longo dense adpresso-pilosulo superne insigniter incrassato; lamina lanceolato-oblonga 14–

20 cm. longa 4.5–6 cm. lata acuta vel acuminata, apice ipso obtuso, basi rotundato-angustata vel obtusa atque subpeltata, supra lucida glabra, costa valde elevata, nervis venisque prominentibus, venulis arcte reticulatis, subtus paullo pallidior ubique pilis brevibus subpatentibus vel fere adpressis pilosula, pinnatinervia, costa gracili elevata, nervis lateralibus utroque latere ca. 12 angulo latiusculo adscendentibus arcuatis prominentibus prope marginem conjunctis, venulis prominentibus arcte reticulatis; inflorescentiae spiciformes axillares singulae vel fasciculatae petiolo vix longiores, spicis interruptis, floribus subverticillatim aggregatis sessilibus, rhachi dense pilis brevibus subpatentibus pilosa; sepala minuta extus sparse breviter pilosula; petala late ovalia vel rotundata vix ultra 1 mm. longa glabra; stamina ca. 1 mm. longa.—COCLÉ: north rim of Valle de Antón, alt. 600–1000 m., Feb. 12, 1939, *P. H. Allen 1656* (Herb. Field Mus., TYPE; duplicate in Herb. Missouri Bot. Gard.).

Among all the Central American species of this genus the present plant is unique in its long and narrow, pinnately nerved, pubescent leaves. In Diels' treatment of the genus in the 'Pflanzenreich' (IV. 94: 198. 1910) the Panama plant runs at once to *H. oblongifolia* (Mart.) Chodat & Hassl., of Brazil and Paraguay, with which it could not be confused.

### CRUCIFERAE

CARDAMINE OVATA Benth.—CHIRIQUÍ: vicinity of "New Switzerland," central valley of Río Chiriquí Viejo, alt. 1800–2000 m., Jan. 6–14, 1939, *P. H. Allen 1345*. Ranging from Mexico to Venezuela and Ecuador, but apparently never before collected in Panama.

### CAPPARIDACEAE

*(P. C. Standley, Chicago)*

CAPPARIS **mirifica** Standl., sp. nov. Arbor 6-metralis ramis gracilibus subteretibus dense molliter pilis longis stellato-pilosis; folia inter maxima sessilia tenuiter coriacea oblonga ca. 27 cm. longa atque 9 cm. lata subito acuminata vel cuspidato-acuminata, basi profunde cordata, sinu clauso, lobis posticis rotundatis, supra in statu adulto fere omnino glabra, tantum

ad costam interdum stellato-tomentosa, costa prominente, nervis venisque subimpressis, subtus pallida ubique tomento laxo molli stellato dense obtecta, pilis marginis brunneis, costa gracili prominente, nervis lateralibus utroque latere ca. 11 angulo lato adscendentibus subarcuatis; pedunculus longissimus folia aequans vel longior gracillimus curvus stellato-pilosus vel glabratus; fructus ca. 20 cm. longus fere 1 cm. crassus inter semina ca. 8 paullo constrictus, basi et apice longe attenuatus, densissime minuteque stellato-tomentosus.—CANAL ZONE: vicinity of Salamanca Hydrographic Station, Río Pequení, alt. about 80 m., July 28–29, 1938, *R. E. Woodson, Jr., P. H. Allen & R. J. Seibert 1591* (Herb. Field Mus., TYPE; duplicate in Herb. Missouri Bot. Gard.)

This is one of the most distinct and extraordinary species that the writer ever has had the opportunity of describing, and it is impossible to suggest any other species to which it may be related. It would be difficult to imagine leaves of a form more improbable in the genus *Capparis*. They are uncommonly large, sessile, deeply cordate at the base with a closed sinus, and covered beneath with a lax tomentum composed of long and soft, stellate hairs. The leaves are dark-margined, because of a border of dark brown hairs. Moreover, the long hairs of the margin appear to collect dust and dirt, thus giving them a more conspicuous margin than the fuscous hairs alone would furnish.

ROSACEAE

PRUNUS CORNIFOLIA Koehne—CHIRIQUÍ: Río Chiriquí Viejo Valley, below Cerro Punta, March 19, 1938, *Gene White 14*. Previously regarded as an endemic of Costa Rica. The leaves of Miss White's specimens attain 15 cm. in length and 6 cm. in width, but otherwise appear typical. The petals of our specimens are described as white, the calyx pale purple, and the flower fragrant.

OXALIDACEAE

OXALIS **darienensis** Woodson, sp. nov. Annua erecta. Caulis simplex 2–3 dm. altus omnino minute pilosulus. Folia alternata

pinnatim 3-foliolata longe petiolata; foliola tenuissime membranacea viridia minutissime papillata margine sparse ciliolata fere rotundato-obovata saepe plus minusve obliqua margine laterali plus minusve undulata apice late rotundata ecallosa, foliolum medium 2 cm. longum 1.6 cm. latum petiolulatum, petiolulo 0.4–0.5 cm. longo, foliolis lateralibus subsessilibus plus minusve minoribus; petiolus 3.0–3.5 cm. longus gracillimus sparse minuteque pilosulus. Pedunculi praeter totam mediam et superiorem partem caulis distributi fere erecti tenues minutissime pilosuli 5–6 cm. longi apice cymam 2-ramosam 0.5–3.5 cm. longam gerentes; rami cymae 2–5-flori simplices; bracteae filiformes ca. 0.1 cm. longae. Pedicelli 0.15 cm. longi glabri. Sepala oblongo-oblanceolata breviter acuminata basi cuneata 0.4 cm. longa glabra viridia. Petala lutea oblongo-obovata rotundata apicem versus minute serrulata 0.7–0.8 cm. longa glabra. Stamina maiora 0.35 cm. longa filamentis edenticulatis minute glandulo-puberulis, minora 0.2 cm. longa glabra. Pistillum angustum 0.25 cm. longum, stylo gracili sparse minuteque glandulo-papillato, stigmate apice 2-partito. Capsula oblongo-obovoidea 0.7 cm. longa 0.4 cm. lata dense minuteque puberula (?). Semina 25 ovoidea 0.1 cm. longa castanea minute tuberculata.—DARIEN: vicinity of Boca de Cupe, alt. ca. 40 m., Oct. 5, 1938, *P. H. Allen 881* (Herb. Missouri Bot. Gard., TYPE).

In Knuth's treatment of the Oxalidaceae (in Engler's 'Pflanzenreich' IV. 130 (Heft 95). 1930) our plants key to *O. ramulosum* Knuth and *O. peruviana*. These species, however, consist of larger, branching plants with glabrous stems, and flowers about twice the size of those of *O. darienensis*. Although the simple stems of *O. darienensis* may be considered a slight character, it is quite invariable amongst the duplicates before me.

## RUTACEAE

*(C. L. Lundell, Ann Arbor, Mich.)*

AMYRIS **barbata** Lundell, sp. nov. Arbor, 10 m. alta. Folia pinnata, petiolata, petiolo usque ad 4 cm. longo. Foliola 5 vel 7, raro 6, membranacea, ovato-oblonga vel oblongo-elliptica,

3.5–8.5 cm. longa, 2–3.5 cm. lata, apice acuminata vel acutiuscula, raro obtusiuscula, basi abrupte acutiuscula, supra glabra, subtus in axillis barbata. Inflorescentiae terminales, late paniculatae, usque ad 8 cm. longae, 8.5 cm. latae. Pedicelli ca. 1 mm. longi. Calyx quinquedenticulatus. Petala 5, glabra, ovato-oblonga, 3 mm. longa. Stamina 10. Ovarium 1-loculare.

A tree, 10 m. high; branchlets rather slender, puberulent, densely so at the nodes. Leaves alternate, pinnate, with petioles up to 4 cm. long; leaflets usually 5 or 7, sometimes 6; rachis slender, drying blackish, barbate-puberulent in axils of leaflets; petiolules of lateral leaflets up to 2.2 mm. long, petiolule of terminal leaflet (when present) up to 1.1 cm. long; blades of leaflets membranaceous, ovate-oblong or oblong-elliptic, 3.5 to 8.5 cm. long, 2 to 3.5 cm. wide, apex usually acuminate or acutish, sometimes obtusish, base rather abruptly acutish, slightly oblique, glabrous above, at first barbate beneath in the axils of the lateral veins, entirely glabrous with age. Inflorescence terminal, broadly paniculate, laxly many-flowered, up to 8 cm. long, 8.5 cm. wide, densely barbate-puberulent at the nodes, nearly glabrous otherwise. Pedicels puberulent, usually less than 1 mm. long. Hypanthium glabrous. Calyx 5-denticulate, about 2.8 mm. wide, ciliolate. Petals 5, glabrous, ovate-oblong, 3 mm. long, rather fleshy. Stamens 10, up to 2.2 mm. long. Disk large, flat, fleshy, shallowly 10-lobed, about 2.7 mm. in diam. Gynophore wanting. Ovary ovoid, glabrous, 1-celled, with 1 pendulous ovule. Stigma large, 3-lobed, sessile.—CHIRIQUÍ: Llanos del Volcán, alt. about 1300 m., Jan. 23, 1939, *P. H. Allen 1540* (Herb. Univ. Michigan, TYPE).

In aspect, *A. barbata* does not closely resemble any species of *Amyris* known to the writer.

## EUPHORBIACEAE

*(P. C. Standley, Chicago)*

STILLINGIA **haematantha** Standl., sp. nov. Arbor 10-metralis omnino glabra, ramulis crassis teretibus pallide brunneis vel ochraceis, internodiis brevibus; stipulae minutae persistentes oblique rotundato-ovatae vix 1 mm. longae pectinato-dentatae

adpressae; folia mediocria breviter petiolata alterna crasse membranacea, petiolo crassiusculo ca. 4 mm. longo apice glandulis 2 patentibus crassis obtusis onusto; lamina oblanceolato-oblonga vel obovato-oblonga 2.5–5 cm. longa 1–1.5 cm. lata acuta vel subobtusa, apice ipso obtuso, basin versus longe cuneato-angustata, in toto margine argute arcteque incurvo-glanduloso-serrata, supra viridis, costa nervisque prominulis, subtus concolor, costa gracili pallida prominente, nervis lateralibus utroque latere ca. 11 angulo semirecto adscendentibus tenerrimis pallidis prominulis; spicae terminales rubrae graciles breviter pedunculatae 4–9.5 cm. longae dense multiflorae, inferne plus minusve interruptae, rectae vel subcurvae; bracteae pauciflorae suborbiculares peltatae apice pectinato-dentatae vel integrae adpressae; flores masculi globosi brevissime pedicellati ca. 1 mm. diam.; stamina 2 breviter exserta; styli brevissimi connati.—COCLÉ: north rim of El Valle, July 9, 1939, *P. H. Allen 1915* (Herb. Field Mus., TYPE; duplicate in Herb. Missouri Bot. Gard.).

Perhaps related to *S. zelayensis* (HBK.) Muell. Arg., which has been collected in the Province of Chiriquí, but that has altogether different foliar glands, and its leaves are broadest at the middle.

## SAPINDACEAE

*(P. C. Standley, Chicago)*

PAULLINIA **Allenii** Standl., sp. nov. Frutex scandens cirrhifer fere glaber, ramis gracillimis obtuse pentagonis et sulcatis fere omnino glabris, internodiis elongatis; folia pinnata 5-foliolata, petiolo gracili 3.5–6 cm. longo glabro nudo, rhachi 2–4 cm. longa nuda, petiolulis 3–7 mm. longis; foliola subaequalia in sicco laete viridia lucida anguste lanceolato-oblonga 9–15 cm. longa 2.5–4 cm. lata longe angusteque acuminata, acumine ipso obtuso, basi subobtusa vel acuta, supra glabra, costa nervisque prominentibus, venis prominentibus arcte reticulatis, subtus concoloria in axillis nervorum sparse breviter barbata, aliter glabra, costa tenera prominente, nervis lateralibus utroque latere ca. 10 obliquis angulo semirecto vel paullo latiore adscendentibus subarcuatis tenerrimis prominentibus,

venulis prominulis arcte reticulatis, marginibus inferne integris, apicem versus remote adpresso-serratis; flores racemosi, racemis longissime pedunculatis laxe paucifloris ca. 3.5 cm. longis, floribus pauci-fasciculatis, pedicellis sparse minute puberulis 3–4 mm. longis, bracteis minutis; sepala valde inaequalia minute ciliolata et dorso sparse minute puberula vel fere omnino glabra, extimis duplo brevioribus, interioribus ca. 3.5 mm. longis apice rotundatis.—COCLÉ: north rim of El Valle de Antón, alt. 600–1000 m., Feb. 12, 1939, *P. H. Allen 1657* (Herb. Field Mus., TYPE).

Apparently a well-differentiated species, the leaves being decidedly unlike those of any other that I have examined. The five leaflets are unusually long and narrow, almost entire, and the petiole and rachis are naked.

PAULLINIA **verecunda** Standl., sp. nov. Frutex scandens, ramis ferrugineis, vetustioribus subteretibus, junioribus obtuse angulatis et striatis densiuscule incurvo-puberulis, internodiis brevibus; folia mediocria ternato-pinnata 3–5.5 cm. longe petiolata, rhachi ca. 5.5 cm. longa anguste alata usque 4 mm. lata, pinnis infimis 2 trifoliolatis, foliolis totius folii 11; foliola sessilia integra ambitu plus minusve variabilia, terminalibus spathulato-obovatis basin versus longe angusteque attenuatis, lateralibus lanceolato-oblongis vel ovato-oblongis basi acutis et saepius inaequalibus, subito lateque acuminata, acumine ipso obtuso, in sicco laete viridia, supra sublucida glabra, costa nervisque prominentibus, venulis prominulis arcte reticulatis, subtus vix pallidiora sparse ad costam nervosque puberula vel fere glabra, venulis prominentibus arcte reticulatis; inflorescentiae axillares racemiformes brevissimae sessiles laxiuscule multiflorae vix ultra 1.5 cm. longae, pedicellis gracilibus 5–7 mm. longis breviter patulo-pilosulis, bracteis minutis subulatis; sepala ovalia tenuia apice rotundata vix ultra 1.5 mm. longa ciliata et sparse minuteque pilosula; petala glabra ciliata usque 4.5 mm. longa alba.—COCLÉ: vicinity of El Valle, alt. 600–1000 m., Dec. 8, 1938, *P. H. Allen 1224* (Herb. Missouri Bot. Gard., TYPE; fragment in Herb. Field Mus.).

In the key to species of *Paullinia* in the 'Flora of the Panama Canal Zone' this plant would run at once to *P. glomerulosa* Radlk., a species with which it has little in common except its ternate-pinnate leaves. The species appears to be a well-marked and isolated one, at least so far as Central America is concerned, distinguished by the combination of ternate-pinnate leaves, entire leaflets, and small sessile inflorescences.

SERJANIA **cissifolia** Standl., sp. nov. Frutex scandens, ramis subteretibus pluricostatis crassis densissime brunnescenti-tomentosis, internodiis elongatis; stipulae persistentes anguste triangulari-attenuatae 5–6 mm. longae obliquae; folia inter minora digitatim trifoliolata membranacea, petiolo crassiusculo 2–4.5 cm. longo dense tomentoso; foliola sessilia inaequalia, terminalia rhombica 6.5–10 cm. longa 3.5–6 cm. lata acuta, basin versus subito contracta et longe cuneato-angustata, lateralia ovalia vel late elliptico-oblonga 5–7 cm. longa 2.5–4 cm. lata, obtusa, basi subinaequilaterali obtusa vel anguste rotundata, in toto margine vel saltem supra medium grosse crenata, crenis latis subsalientibus abrupte apiculatis, utrinque dense pilis mollibus fulvidis patentibus vel subadpressis pilosa, subtus paullo pallidiora; flores majusculi in paniculas racemiformes axillares et solitarias vel terminales et paniculatas aggregati, paniculis ca. 2.5 cm. longis 2–3 cm. latis densissime multifloris crasse pedunculatis, rhachi dense ochraceo-tomentosa, pedicellis usque 6 mm. longis dense tomentosis, bracteis oblongis vel ovatis parvis extus dense tomentosis intus glabris; sepala paullo inaequalia ovalia vel late obovata apice rotundata usque 4.5 mm. longa extus dense tomentella; petala alba spathulato-obovata usque 6 mm. longa apice rotundata villoso-ciliata glabra; filamenta 4 mm. longa sparse albo-pilosa, antheris ca. 0.8 mm. longis.—VERAGUAS: hills west of Soná, alt. 500 m., Nov. 24, 1938, *P. H. Allen 1021* (Herb. Field Mus., TYPE).

A most unusual plant for this genus, because of the merely 3-foliolate, densely pubescent leaves. The foliage is strikingly like that of *Cissus rhombifolia* Vahl.

### RHAMNACEAE
*(C. V. Morton, Washington, D. C.)*

RHAMNUS CAPREAEFOLIA Schl.—CHIRIQUÍ: vicinity of Cerro Punta, Jan. 24, 1939, *P. H. Allen 1566*. Previously known from Mexico to Costa Rica.

### TILIACEAE
*(P. C. Standley, Chicago)*

SLOANEA **platyphylla** Standl., sp. nov. Arbor 20-metralis, ramulis crassis, internodiis brevibus dense pilis longiusculis sordido-brunnescentibus pilosis; stipulae lanceolato-ovatae subfoliaceae usque 2.5 cm. longae acuminatae utrinque dense subadpresso-pilosae; folia magna longipetiolata crasse membranacea, petiolo gracili tereti ca. 7 cm. longo dense tomentuloso atque piloso; lamina late ovalis vel latissime elliptica 25–27 cm. longa 17–19 cm. lata, apice breviter obtuseque acutata, basi late rotundata, supra in sicco fusco-brunnescens ad costam nervosque pilosa, aliter glabrata, subtus fere concolor ubique dense breviter velutino-pilosula, costa gracili elevata, nervis lateralibus utroque latere ca. 11 angulo lato interdum fere recto adscendentibus leviter arcuatis prominentibus juxta marginem arcuato-conjunctis, venis numerosis distantibus subparallelis connexis, venulis prominentibus sat arcte reticulatis; inflorescentiae axillares simplices racemosae sessiles vel subsessiles usque 6 cm. longae ca. 7-florae, pedicellis crassiusculis usque 1.5 cm. longis densissime patenti-pilosis, bracteis pedicellis duplo brevioribus vel eis fere aequilongis; sepala linearilanceolata inaequalia 7–9 mm. longa longe attenuata, extus breviter pilosula, intus sericea, patentia; ovarium ovoideum dense hispidulum atque breviter echinatum.—COCLÉ: north (wet) rim, vicinity of El Valle, alt. 800–1000 m., May 21, 1939, *P. H. Allen 1810* (Herb. Field Mus., TYPE; duplicate in Herb. Missouri Bot. Gard.).

Similar to this is *Sloanea microcephala* Standl., also of Panama, but that differs in having relatively broader, coarsely dentate, glabrate leaves, very small sepals, and an altogether different inflorescence.

## MALVACEAE

*(P. C. Standley, Chicago)*

HIBISCUS SPATHULATUS Garcke—VERAGUAS: hills west of Soná, alt. ca. 500 m., Nov. 24, 1938, *P. H. Allen 1019*. Apparently new to North America. Previously known from British Guiana and Brazil.

NEOBRITTONIA ACERIFOLIA (Lag.) Hochr.—CHIRIQUÍ: trail from Paso Ancho to Monte Lirio, valley of Río Chiriquí Viejo, Jan. 16, 1939, *P. H. Allen 1493*. Fairly common in Guatemala, but previously unknown from either Costa Rica or Panama.

WERCKLEA LUTEA Rolfe—CHIRIQUÍ: upper valley of Río Chiriquí Viejo, near Monte Lirio, July 17, 1938, *P. White 175*. Genus new for Panama; previously unknown outside Costa Rica.

## MARCGRAVIACEAE

MARCGRAVIA **ampulligera** Woodson, sp. nov. Frutex volubilis ut dicitur giganteus omnino glaber, ramis crassiusculis subteretibus fulvis dense lenticellatis. Folia ramorum fertilium sessilia oblonga apice abrupte acuminata basi late obtusa 6–13 cm. longa 3.5–4.5 cm. lata opaca brunnescentia eglandulosa costa crassiuscula prominente utrinque enervia. Inflorescentia umbelliformis ca. 28-flora, pedicellis patulis crassiusculis lenticellatis 5.5–6.0 cm. longis, floribus paululo oblique insertis, prophyllis 2 ad basin calycis insertis deltoideis obtusis ca. 0.2 cm. longis. Bracteae steriles apulliformes clavato-tubulosae rectae 4 cm. longae, pedicello 1 cm. longo, ostio recurvato. Sepala subreniformia rotundata 0.3 cm. longa 0.5 cm. lata margine minutissime denticulata; petalorum calyptra anguste ovoidea 2 cm. longa basi 0.5 cm. diam. apice obtusa. Stamina ca. 33, filamentis filiformibus 1 cm. longis, antheris linearibus 0.6 cm. longis. Ovarium subovoideum cum stylo 1 cm. longum. —CHIRIQUÍ: trail from Paso Ancho to Monte Lirio, upper valley of Río Chiriquí Viejo, alt. 1500–2000 m., Jan. 16, 1939, *P. H. Allen 1488* (Herb. Missouri Bot. Gard., TYPE).

This species is somewhat intermediate between the subgenera *Orthothalamium* and *Plagiothalamium* of Wittmack, since, although the flowers are somewhat obliquely placed upon

the pedicel, the corolline calyptra is nearly cylindrical and the number of stamens is relatively high. The shape of the nectariferous bracts is distinctive because of the recurved lip of the orifice, and the size is relatively large as well.

MARCGRAVIA MEMBRANACEA Standl.—COCLÉ: north rim of El Valle de Antón, alt. 700 m., March 19, 1939, *P. H. Allen 1739.* Previously known only from the type collection in the highlands of Costa Rica.

SOUROUBEA TRIANDRA Lundell.—COCLÉ: north rim of El Valle de Antón, alt. 600–1000 m., July 9, 1939, *P. H. Allen 1914.* Previously known only from the type collection in British Honduras *(C. L. Lundell 6492)* and cotype in Guatemala. There are differences between Allen's plants and the type, being chiefly variations in petal number, length of nectary, and form of the filaments. However, in view of the limited material available, it seems better to refer our plants to *triandra,* at least for the present.

SOUROUBEA **venosa** Schery, n. sp. Arbor glabra ut dicitur 9 m. alta, ramis rimosis. Folia alternata subsessilia late elliptica apice obtusa vel rotundata basi obtuse cuneata 7–11 cm. longa 3.5–5.5 cm. lata tenuiter coriacea utrinque opaca, venis supra immersis subtus prominentibus prope margines reticulatis. Racemus 15 cm. longus dense multiflorus, floribus congestis aureis, pedicellis ca. 0.75 cm. longis, nectariis tubularibus subsessilibus cruribus brevissimis obtusis paene aequalibus 0.6–0.8 cm. longis, ostio 0.2 cm. diam. Sepala et prophylla 7 orbiculata-reniformia 0.1 cm. longa 0.15 cm. lata. Corolla 5-lobata ca. 0.4 cm. longa. Stamina 5, filamentis linearibus vel prope basim paene dilatatis.—PANAMÁ: between Las Margaritas and El Valle de Antón, July 15–Aug. 8, 1938, *Woodson, Allen & Seibert 1289* (Herb. Missouri Bot. Gard., TYPE).

This species is closely related to *S. exauriculata* Delp. However, the latter is generally larger than *S. venosa,* the pedicel being about 1.1 cm. long and the calyx about 0.5 cm. wide; the petals about 0.6 cm. long, the nectariferous bracts about 1.3 cm. long, the tertiary veins not prominent, the leaves oblanceolate, and the filaments broad, expanded at the base. Also in the

specimens examined, the leaves of *S. exauriculata* dry gray above, tan beneath, while those of *S. venosa* dry gray to black above, dark brown beneath.

GUTTIFERAE
*(P. C. Standley, Chicago)*

CLUSIA **coclensis** Standl., sp. nov. Frutex 1.5 m. altus omnino glaber, ramis crassis subteretibus ferrugineis striatis, internodiis brevibus; folia parva breviter petiolata crasse coriacea, petiolo lato atque subvaginante 4–5 mm. longo subalato; lamina ovalis vel ovali-obovata 3.5–6 cm. longa 2–3.5 cm. lata apice late rotundata, basi cuneato-angustata, supra lucida, costa prominula, nervis manifestis sed vix elevatis, subtus opaca, costa angusta elevata, nervis lateralibus utroque latere ca. 15 vix prominulis interdum obsoletis angulo lato saepe fere recto abeuntibus tenerrimis fere rectis; inflorescentia terminalis ca. 1 cm. longe crasse pedunculata 1–3-flora, floribus sessilibus albis, bracteis basalibus late rotundatis 6–7 mm. longis subpatentibus; sepala rotundata late membranaceo-marginata ca. 9 mm. longa apice rotundata; petala ca. 6 atque 1.5 cm. longa apice rotundata, marginibus minute serrulatis in sicco pallidis; stamina numerosa valde inaequalia, antheris linearibus 3 mm. longis.—COCLÉ: vicinity of El Valle, alt. 800–1000 m., Sept. 5, 1938, *P. H. Allen 771* (Herb. Field Mus., TYPE; duplicate in Herb. Missouri Bot. Gard.).

A rather well-marked species among Central American representatives of the genus, notable for the small, broad leaves, which are thick-coriaceous and broadly rounded at the apex.

LOASACEAE

LOASA GRANDIS Standl.—COCLÉ: north rim of El Valle de Antón, alt. 600–1000 m., Feb. 12, 1939, *P. H. Allen 1658*. Apparently the second collection of this giant species, originally described from Guanacaste, Costa Rica.

BEGONIACEAE
*(P. C. Standley, Chicago)*

BEGONIA **chiriquensis** Standl., sp. nov. Herba laxa erecta vel decumbens ca. 30 cm. alta, caule e nodis infimis radices emit-

tente sparse ramoso primo dense ferrugineo-villoso, glabrescente, internodiis brevibus; stipulae oblique ovatae vel ovales 5–7 mm. longae obtusae virides integrae vel grosse paucidentatae; folia parva in sicco tenuia breviter petiolata, petiolo usque 9 mm. longo longivilloso; lamina lanceolato-oblonga vel oblongo-obovata plus minusve obliqua 0.5–5 cm. longa 0.8–2 cm. lata acuta vel longi-acuminata, basi obtusa et valde obliqua, latere altero bene longiore, supra viridis fere glabra vel tantum ad costam nervosque sparse villosula, subtus ubique densissime pallido-punctata ad nervos sparse ferrugineo-villosula vel fere glabra, nervis lateralibus utroque latere ca. 5 obliquis, margine grosse inaequaliter inciso-dentato interdum sublobato, dentibus setuloso-mucronatis; flores albi in cymas paucifloras ca. 2.5 cm. longe pedunculatas dispositi, pedicellis glabris fere filiformibus valde elongatis; sepala petalaque ovalia vix plus quam 4–5 mm. longa apice rotundata glabra; stamina glabra 2 mm. longa; fructus glaber 18 mm. longus 15 mm. latus viridis basi late campanulatus, parte superiore longe conica atque 1 cm. longa, angulis aliformibus divaricatis obtuse triangularibus.—CHIRIQUÍ: epiphytic, trail from Cerro Punta to headwaters of Río Caldera, alt. 2250 to 2500 m., Jan. 14, 1939, *P. H. Allen 1345* (Herb. Field Mus., TYPE; duplicate in Herb. Missouri Bot. Gard.); stream bank in rain forest, Bajo Chorro, Boquete District, alt. 2100 m., Jan. 12, 1938, *M. E. Davidson 107*.

Referable to the subgenus *Casparya*. Two other species of this group found in Costa Rica, *Begonia Pittieri* C. DC. and *B. Torresii* Standl., differ in having glabrous stems. This group of *Begonia* is best represented in Colombia, and it may well be that the Panama plant is referable to some species described from that country, but all the Colombian species of which I have seen material seem to differ essentially.

BEGONIA **pumilio** Standl., sp. nov. Herba perennis acaulis nana, caudicibus ut videtur brevibus crassisque dense foliatis; stipulae ferrugineae tenues ovato-triangulares 5–6 mm. longae sparse longi-pilosae apice in setam 3–5 mm. longam desinentibus; folia omnia basalia longissime petiolata in vivo ut videtur

carnosa, petiolo gracillimo 3–7 cm. longo sat dense pilis longis laxis plerumque patentibus ferrugineis villoso; lamina 4–5 mm. supra basin peltata ovata vel late ovata 2–4.5 cm. longa 1.5–4 cm. lata longi-acuminata, basi late rotundata ca. 8-nervia, supra sparse pilis longis laxis rufidulis villosa, subtus paullo pallidior ubique dense albo-punctata densius praesertim ad nervos villosa; flores monoeci cymosi, pedunculis gracilibus erectis 4–6 cm. longis dense longi-villosis, cymis densiuscule multifloris ca. 3 cm. altis et 4 cm. latis, ramis dense villosis, pedicellis brevibus vel aliquanto elongatis villosis, bracteis hyalinis latis villosis et ciliatis usque 5 mm. longis; sepala floris feminei suborbicularia ca. 4 mm. longa; capsula compressa suborbicularis 5 mm. longa utroque latere fere aequaliter alata, ala vix ultra 1 mm. lata.—PANAMÁ: Cerro Campana, flowers pink, growing on boulders, Dec. 31, 1939, *P. H. Allen 2089* (Herb. Field Mus., TYPE).

Easily recognized among the species of Panama and Costa Rica because of the combination of dwarf habit and peltate leaves.

### CACTACEAE

*(L. Cutak, St. Louis)*

PSEUDORHIPSALIS HIMANTOCLADA (Roland-Gosselin) Britt. & Rose—COCLÉ: north rim of El Valle de Antón, July 9, 1939, *P. H. Allen 1897*. Previously known as an endemic of Costa Rica. This species is very difficult to distinguish from the lowland *Wittia panamensis* Britt. & Rose, at least in the dried condition.

EPIPHYLLUM PITTIERI (Weber) Britt. & Rose—BOCAS DEL TORO: Quebrada Nigua, vicinity of Almirante Bay, Oct. 21, 1938, *H. Wedel 7*. Previously known from Costa Rica.

### MYRTACEAE

*(P. C. Standley, Chicago)*

EUGENIA **vallis** Standl., sp. nov. Arbor 8-metralis, cortice laevi ferrugineo, ramulis rigidis teretibus rimosis ferrugineis, novellis dense pilis albidis mollibus patentibus vel adscendentibus pilosis, internodiis brevibus vel elongatis; folia inter minora breviter petiolata firme membranacea, petiolo 4–7 mm.

longo dense breviter piloso; lamina oblanceolato-oblonga vel obovato-oblonga 4–7 cm. longa 1.2–2.5 cm. lata obtusa, basin versus cuneato-attenuata, supra in sicco olivacea sat dense pilis pallidis mollibus pilosa vel glabrata, dense impresso-punctata, costa nervisque vix elevatis, subtus paullo pallidior ad costam prominentem sericea, aliter molliter pilis longis pilosa vel serius glabrata, nervis lateralibus utroque latere ca. 7 teneris prominulis; flores racemoso-paniculati, paniculis axillaribus foliis vulgo multo longioribus laxis pauciramosis longi-pedunculatis, ramis patentibus dense patenti-pilosis, racemis laxe paucifloris, pedicellis usque 4 mm. longis; hypanthium ut calyx extus dense molliter pilosum vix ultra 1 mm. longum, calyce profunde lobato, lobis ad anthesin abrupte reflexis obtusis intus glabris; petala alba tenuia glabra fere 3 mm. longa; stylus filiformis glaber 4–5 mm. longus.—COCLÉ: south (dry) rim, vicinity of El Valle, alt. 600–1000 m., May 14, 1939, *P. H. Allen 1773* (Herb. Field Mus., TYPE; duplicate in Herb. Missouri Bot. Gard.).

There is some question as to whether the present plant is properly referable to *Eugenia,* but no better place for it is apparent. If a true *Eugenia,* it is unusually distinct among the Central American species, being noteworthy chiefly for the large, openly branched, many-flowered panicles.

## ONAGRACEAE

*(P. A. Munz, Claremont, Calif.)*

JUSSIAEA INCLINATA L. f.—VERAGUAS: floating in stream, hills west of Soná, alt. ca. 500 m., Nov. 24, 1938, *P. H. Allen 1056.* Previously thought to be confined to the Mexican states of Chiapas and Guerrero.

## ARALIACEAE

*(A. C. Smith, New York)*

OREOPANAX **vestitum** A. C. Smith, sp. nov. Arbor 15 m. alta, trunco basin versus circiter 50 cm. diametro (ex Austin Smith), vel frutex scandens (ex Allen); ramulis gracilibus, juventute ferrugineo-tomentosis (pilis breviter cauliculatis vel subsessilibus multo-ramosis) mox glabrescentibus rugosis cinereis

vel stramineis; foliis simplicibus, petiolis rectis striatis, 2–10 cm. longis juventute ut ramulis tomentellis mox glabris, laminis tenuiter coriaceis obovato-ellipticis vel elliptico-oblongis, 9–20 cm. longis, 3.5–7 cm. latis, basi acutis vel cuneatis vel rotundatis, apice breviter calloso-apiculatis vel acuminatis (acumine ad 1.5 cm. longo apiculato), margine integris et anguste revolutis, supra glabris vel parcissime (juventute plus minusve densissime) stellato-pilosis, subtus stellato-tomentellis (pilis brevissime cauliculatis vel interdum subsessilibus, 6–9-ramosis, ramulis circiter 0.2 mm. longis) demum glabrescentibus, nervis primariis 3 e basi adscendentibus, costa valida, nervis secundariis utroque 3–5 adscendentibus utrinque prominulis, venulis inconspicuis; inflorescentia mascula terminali ad 9 cm. longa et lata, ramulis, bracteis pedunculisque ferrugineo-stellato-tomentellis, bracteis lineari-oblongis acutis 1–2 mm. longis, pedunculis gracilibus, 4–9 mm. longis; capitulis subglobosis 3–5 mm. diametro, bracteolis late ovatis apiculatis circiter 1 mm. longis extus pilosis, floribus 10–15 per capitulum glabris; calyce sub anthesi cupuliformi 1–1.3 mm. diametro, limbo inconspicuo truncato vel obscure dentato; petalis 4 vel 5 ovato-deltoideis, 1.4–1.7 mm. longis, circiter 1.2 mm. latis, subacutis; filamentis maturitate filiformibus 3–3.5 mm. longis, antheris oblongis circiter 0.9 mm. longis; stylis 2 circiter 0.5 mm. longis; inflorescentia hermaphrodita quam mascula paullo minore ad 5 cm. longa et lata, pedunculis 3–5 mm. longis, floribus 5–9 per capitulum; calyce sub anthesi coriaceo subgloboso 1.3–1.7 mm. diametro; petalis subconnatis et calyptratis, circiter 1 mm. longis et latis; filamentis brevissimis; stylis 4 vel 5 e basi liberis erectis, loculis 4 vel 5; fructibus juvenilibus plerumque circiter 6 per capitulum stylis recurvatis coronatis.—Costa Rica: alajuela: San Carlos, at edge of forest near Sucre, alt. about 975 m., March 1, 1939, *Austin Smith H1167* (Herb. New York Bot. Gard., type); Panama: chiriquí: upper valley of Río Chiriquí Viejo, trail from Paso Ancho to Monte Lirio, alt. 1500–2000 m., Jan. 16, 1939, *P. H. Allen* (Herb. New York Bot. Gard.).

The type bears hermaphrodite, and the Panama plant

staminate, inflorescences, and for this reason floral comparisons between the two are not conclusive. In foliage the two plants show some differences: the type has obovate-elliptic leaf-blades which are usually acute at base and short-apiculate at apex, while the Panama collection has somewhat longer elliptic leaf-blades which are rounded at base and comparatively long-acuminate at apex. These variations, however, are not remarkable in *Oreopanax,* where they are paralleled in other species. Austin Smith's collection is chosen as the type because the number of styles in hermaphrodite flowers appears to be an important character in the genus.

The new species is related to *O. Oerstedianum* March. and *O. Standleyi* A. C. Smith, both of which are known only from Costa Rica. *O. vestitum* is at once distinguished from *O. Oerstedianum* by its less robust habit and especially by the close indumentum of its branchlets and petioles; in Marchal's species the hairs of these parts have a remarkably stout stalk about 2 mm. long. The new species differs from *O. Standleyi* by its proportionately much narrower leaves and its fewer styles and locules, as well as by its nearly sessile rather than long-stalked hairs of the lower leaf-surface. Both staminate and hermaphrodite inflorescences of *O. vestitum* are more compact than those of its allies.

GILIBERTIA **sessiliflora** Standl. & A. C. Smith, sp. nov. Arbor ubique glabra; ramulis crassis cinereis rugosis; petiolis gracilibus rectis 3–7 cm. longis; laminis chartaceis vel tenuiter coriaceis, late ellipticis, 12–20 cm. longis, 7–13 cm. latis, basi obtusis, apice obtusis vel obtuse et breviter acuminatis, margine undulato-crenatis, pinnatinerviis, costa prominente, nervis secundariis utrinque 7–9 subrectis vel leviter arcuato-adscendentibus paullo elevatis, venulis leviter prominulis; rhachide non visa, umbellis ut videtur 10 vel ultra per inflorescentiam; pedunculis crassis striatis rugosis, 2.5–4 cm. longis, medium versus conspicue articulatis et bracteatis (bracteis coriaceis connatis 3–4 mm. longis); floribus capitatis sessilibus 5-meris 10–15 per capitulum, bracteis papyraceis deltoideis subacutis circiter 2 mm. longis subtentis; receptaculis 5–8 mm. latis;

calyce obconico vel breviter cylindrico, 2–3 mm. longo, circiter 2 mm. diametro, lobis deltoideis acutis circiter 0.7 mm. longis; petalis pallide luteis deltoideo-lanceolatis, 2.5–3 mm. longis, 1–1.5 mm. latis, apice acutis et inflexis; filamentis sub anthesi circiter 3 mm. longis, antheris subgloboso-oblongis circiter 0.7 mm. longis; stylis in columnam brevem carnosam connatis, stigmatibus plus minusve distinctis.—CHIRIQUÍ: Boquete District, near Boquete, alt. 3800 ft., June 26, 1938, *M. E. Davidson 769* (Herb. Field Mus., TYPE).

*G. sessiliflora* is a remarkable species, disagreeing with the other members of the genus by the character from which the specific name is derived, the sessile flowers. Superficially, it may appear that an araliaceous plant of this region with the flowers in heads should be sought in *Oreopanax* rather than in *Gilibertia*. The flowers of *Oreopanax*, however, are polygamo-dioecious or rarely polygamo-monoecious, while those of the present plant are hermaphrodite. In all its characters except the sessile flowers, moreover, *G. sessiliflora* appears correctly placed in *Gilibertia*. In its foliage and its rugose articulate peduncles with conspicuous connate bracts it bears a strong resemblance to *G. gonatopoda* Donn. Sm. The discovery of the new species makes the separation of the genera *Gilibertia* and *Oreopanax* somewhat more difficult, but nevertheless we believe that their maintenance is not seriously to be questioned.

OREOPANAX COSTARICENSIS March.—CHIRIQUÍ: vicinity of "New Switzerland," central valley of Río Chiriquí Viejo, alt. ca. 1800–2000 m., Jan. 6–14, 1939, *P. H. Allen 1395;* Río Chiriquí Viejo valley, near El Volcán, July 17, 1938, *P. White 171;* between El Volcán and Cerro Punta, Río Chiriquí Viejo valley, March 20, 1938, *G. White*. Apparently abundant in this part of western Chiriquí, but previously unknown in Panama.

## ERICACEAE

*(W. H. Camp and A. C. Smith, New York)*

CAVENDISHIA **stenophylla** A. C. Smith, sp. nov. Frutex gracilis epiphyticus ut videtur ubique glaber; ramulis cinereis subteretibus vel juventute leviter angulatis; petiolis subteret-

ibus leviter striatis nigrescentibus 4–6 mm. longis; laminis chartaceis subbullatis lineari-oblongis, 8–13 cm. longis, 1.3–2 cm. latis, basi rotundatis et saepe leviter subcordatis, apice gradatim attenuatis (apice ipso obtuso), margine integris et conspicue revolutis, pinnatinerviis, costa supra impressa subtus prominente, nervis secundariis inconspicuis 5–7 (2 vel 3 prope basin orientibus adscendentibus, aliis brevibus patentibus) marginem versus anastomosantibus, supra cum venulis copiose reticulatis prominulis, subtus leviter elevatis; inflorescentiis terminalibus (semper?) racemosis 15–20-floris basi decidue bracteatis, rhachide gracili purpurascente leviter angulata 7–8 cm. longa; pedicellis gracilibus 12–16 mm. longis, bracteis inconspicuis papyraceis ovato-oblongis 2–4 mm. longis et latis subtentis, paullo infra medium bibracteolatis (bracteolis ovatis circiter 1 mm. longis et latis); calyce basi late apophysato, tubo post anthesi rugoso 2–3 mm. longo et 4–5 mm. diametro, superne constricto, limbo erecto chartaceo lobis inclusis 4–5 mm. longo, lobis deltoideis callosis acutis circiter 1.5 mm. longis et latis; corolla non visa.—PANAMÁ: in cloud forest on hills above Campana, alt. 600–800 m., July 1, 1939, *P. H. Allen 1880* (Herb. New York Bot. Gard., TYPE).

Although corollas are lacking on the available specimens, I venture to describe the plant as a new species, since the characters of the inflorescence and calyx place the plant without question in *Cavendishia,* where it can be related only to the Costa Rican *C. melastomoides* (Kl.) Hemsl. In calyx characters, which are important as indications of specific relationship in the genus, the two species are essentially similar; in inflorescence characters, *C. stenophylla* is distinguished from its ally by the smaller bracts and bracteoles and the higher position of the latter on the pedicels. The most obvious differences, however, are found in comparing the two plants as to leaf characters, the blades of the new species being nearly twice as long as those of *C. melastomoides* and about the same in breadth, with conspicuously different base and venation.

GAULTHERIA **chiriquensis** Camp, sp. nov. Frutex ad 2 m. altus, ramulis crispe pilosis eglandulosis; folia rotundo-ovata

vel rectangulo-ovata, 3–5.5 cm. longa, 2–3.5 cm. lata, basi profunde cordata, apice obtusa vel abrupto-acuminata, supra minute puberulenta, subtus persistente pubescentia, pilis densis ferrugineis, margine integra vel obscure serrata, setosa, setis deciduis; racemi 2–3 cm. longi, rhachis et pedicelli (circ. 4–5 mm. longi) dense albido-puberuli et ± dense ferrugino-pilosi, eglandulosi, bracteis pubescentibus; calyx 5-lobus, lobis acuminatis, albido-puberulis, apice sparse hirsutis; corolla urceolata, circ. 5 mm. longa, purpurea, apice manifeste contracta, albido-puberulenta et crispe pilosa, pilis eglandulosis; stamina 10, circ. 4 mm. longa, filamentis dense pubescentibus; ovarium et stylus albido-pubescentes.—CHIRIQUÍ: Llanos del Volcán, alt. ca. 1300 m., Jan. 23, 1939, *P. H. Allen 1542* (New York Bot. Gard., TYPE).

*G. chiriquensis* strongly resembles the Mexican *G. hirtiflora* Benth. in plant size and general appearance but lacks the glandular pubescence of this species. Of the South American species, it bears considerable resemblance to the widespread *G. pichinchensis* Benth., of Colombia, Ecuador, Bolivia and perhaps Peru. It differs from the type of *G. pichinchensis* (*Hartweg 1228* from Colombia) by being slightly less hirsute, with the leaves relatively broader and more deeply cordate at the base; also, the calyx and corolla of *G. pichinchensis* lack the setae characteristic of *G. chiriquensis*.

## THEOPHRASTACEAE

*(C. L. Lundell, Ann Arbor, Mich.)*

JACQUINIA **panamensis** Lundell, sp. nov. Arbor, 3 m. alta; ramuli puberuli. Folia coriacea, petiolata, petiolo usque ad 3 mm. longo, parce puberulo, oblanceolata vel oblanceolato-oblonga, 3.2–6.7 cm. longa, 1.4–2.5 cm. lata, apice acuta, aciculari, basi acuta vel subcuneata. Inflorescentiae terminales, racemosae, 3–13-florae, raro parce puberulae, pedunculatae. Pedicelli 8–12 mm. longi, apice incrassati. Flores aurantiaci, 9–11 mm. longi. Sepala suborbicularia, 3.5–4 mm. longa. Corolla intus ad basin minute lepidotula, lobis oblongis, ca. 5 mm. longis, staminodiis oblongo-cordatis, usque ad 4.3 mm. longis. Stamina ca. 6 mm. longa.

A tree, 3 m. high; branchlets puberulent, striate, angulate. Leaves coriaceous, short-petiolate, the petioles up to 3 mm. long, at first sparsely puberulent; leaf blades oblanceolate or oblanceolate-oblong, 3.2 to 6.7 cm. long, 1.4 to 2.5 cm. wide, apex acute, acicular, base acute or subcuneate, glabrous except along the costa, obscurely triplinerved, costa subimpressed above and puberulent at base, elevated beneath. Inflorescence terminal, at first subcorymbose, at length racemose, erect, 3- to 13-flowered, glabrous or rarely sparsely puberulent, shorter than or subequaling leaves, pedunculate. Pedicels 8 to 12 mm. long, thickened above. Bractlets ciliate. Flowers orange-colored, 9 to 11 mm. long. Sepals suborbicular, 3.5 to 4 mm. long, thick, minutely erose. Petals united to the middle, minutely lepidote within at base; the lobes oblong, about 5 mm. long, apex rounded, reflexed at anthesis; the staminodes subequaling lobes, oblong-cordate, up to 4.3 mm. long. Stamens about 6 mm. long, slightly exceeding corolla-tube; filaments sparsely lepidote; anthers about 2.5 mm. long, emarginate. Style well developed. —PANAMÁ: vicinity of Bejuco, Oct. 18, 1938, *P. H. Allen 985* (Herb. Univ. Michigan, TYPE).

*Jacquinia panamensis* approaches *J. axillaris* Oerst. of Mexico, but may be separated from that species by its oblanceolate rather than lanceolate leaves, costa subimpressed above, not prominulous, flowers up to 13 in a raceme compared with about 5 in *J. axillaris*, and style elongate rather than very short.

## LOGANIACEAE

*(C. V. Morton, Washington, D. C.)*

BUDDLEJA ALPINA Oerst.—CHIRIQUÍ: Llanos del Volcán, near Paso Ancho, July 31, 1938, *P. White 202*. Previously known from Costa Rica.

## GENTIANACEAE

*(F. P. Jonker, Utrecht)*

CURTIA TENUIFOLIA (Aubl.) Knobl.—PANAMÁ: vicinity of Pacora, Oct. 18, 1938, *P. H. Allen 994;* COCLÉ: vicinity of Natá, Sept. 12, 1938, *P. H. Allen 832*. Previously known from Brazil and the Guianas.

LISIANTHUS CONGESTUS Standl.—COCLÉ: El Valle de Antón, Sept. 5, 1938, *P. H. Allen 783*. Previously known from Guatemala.

LISIANTHUS LATIFOLIUS Sw.—COCLÉ: north rim of El Valle de Antón, trail to San Miguel, May 14, 1939, *P. H. Allen 1793*. Previously known from Jamaica.

SCHULTESIA BRACHYPTERA Cham.—COCLÉ: vicinity of Nata, Sept. 12, 1938, *P. H. Allen 831;* VERAGUAS: hills west of Soná, Nov. 24, 1938, *P. H. Allen 1069*. Previously known from Brazil, the Guianas, and Nicaragua.

SCHULTESIA PECKIANA Robinson—CHIRIQUÍ: hills near Cerro Punta, Jan., 1938, *G. & P. White 104*. Previously known from British Honduras.

APOCYNACEAE

RAUWOLFIA PURPURASCENS Standl.—CANAL ZONE: near Gorgas Memorial Laboratory, vicinity of Miraflores, June 20, 1938, *Gene White 120*. This species is noteworthy amongst the Rauwolfias of Panama because of its eglandular petioles. When first described (Field Mus. Publ. Bot. **4**: 255. 1929), only flowering material was available, and the species apparently has not been collected until the present. Miss White's specimen is in full fruit, and, although without flowers, agrees well with the type specimen in vegetative characters. The drupes are compressed-ovoid, slightly emarginate, 0.7–0.9 cm. long, equally broad, and are "green, turning to purple." The habit of the species also is known for the first time, and is described as a "tree 20–25 feet tall."

TABERNAEMONTANA **pendula** Woodson, sp. nov. Arbor 8-metralis. Rami dichotomi graciliusculi cortice luteo striato tecti. Folia opposita petiolata obovato-ovalia apice abrupte subcaudato-acuminata basi late cuneata in nodis plus minusve inaequalia 6.5–17.0 cm. longa 3–8 cm. lata membranacea opaca glabra; petiolo 1 cm. longo. Inflorescentia terminalis longissime pedunculata pluriflora pendula; pedunculo primo sterili 6–17 cm. longo fere filiformi glabro apici dichotomo, ramulis florigeris 2–6 cm. longis, bracteis minute ovatis caducis, pedicellis 0.6–0.7 cm. longis. Calycis lobi ovati 0.2 cm. longi sub-

scariacei glabri. Corollae tubus 0.5 cm. longus basi ca. 0.1 cm. diam. extus glabrus vel minutissime papillatus prope apicem staminigerus, lobi oblique obovati 1.0–1.1 cm. longi brunnei intus basi papillati. Anthera livida 0.2 cm. longa ad medium exserta. Folliculi ignoti.—COCLÉ: north rim of El Valle de Antón, alt. 600–1000 m., March 19, 1939, *P. H. Allen 1734* (Herb. Missouri Bot. Gard., TYPE).

This species probably is most closely related to *T. amygdalifolia* Jacq., because of the conspicuously exserted anthers. However, the latter has a much shorter inflorescence, and larger, white flowers.

PRESTONIA **Allenii** Woodson, sp. nov. Frutex volubilis omnino dense luteo-pubescens. Ramuli crassiusculi tomentosi. Folia obovato-ovalia apice abrupte breviterque acuminata basi late cuneata obscureque cordata 13–19 cm. longa 5.5–11.0 cm. lata membranacea supra strigillosa subtus pallidiora dense tomentulosa; petiolo 0.5–0.7 cm. longo tomentuloso. Inflorescentia interpetiolata dense umbellata pluriflora; pedunculo 1.5 cm. longo tomentuloso; bracteis lanceolatis foliaceis 0.5–1.0 cm. longis hispidulis; pedicellis 1 cm. longis dense tomentulosis. Calycis lacinii oblongo-lanceolati acuminati 2.5 cm. longi foliacei hirtelli, squamellis dense laceratis hirtellis. Corollae subinfundibuliformis extus omnino dense hispidulae tubus 4 cm. longus basi ca. 0.5 cm. diam. tertia parte superiore staminigerus ibique conico-dilatatus, ostio ca. 0.9 cm. diametro, lobi oblique obovati 1.5 cm. longi patuli. Anthera sagittata 0.8 cm. longa glabra. Ovaria ovoidea ca. 0.2 cm. longa glabra. Nectarium conico-annulare ostio 5-lobato glabro ovarium paulo superans. Folliculi ignoti.—COCLÉ: north rim of El Valle de Antón, June 4, 1939, *P. H. Allen & A. H. G. Alston 1855* (Herb. Missouri Bot. Gard., TYPE).

Mr. Allen describes this species as follows: "Corky vine; corolla lobes green, throat of tube yellow." The subinfundibuliform corolla recalls that of *P. speciosa* Donn. Sm. and *P. remediorum* Woods., but differs from both in the unusually fleshy and pronounced lobes of the faucal annulus, and in the rather poorly manifest callous ridges which extend completely

from the insertion of the stamens to the annulus. The anthers are barely included.

ASCLEPIADACEAE

FUNASTRUM GLAUCUM (HBK.) Schltr.—HERRERA: vicinity of Chitré, alt. ca. 20 m., Nov. 26, 1938, *P. H. Allen 1090*. Apparently the first record of this species from Central America.

GONOLOBUS **Allenii** Woodson, sp. nov. (fig. 1). Frutex volu-

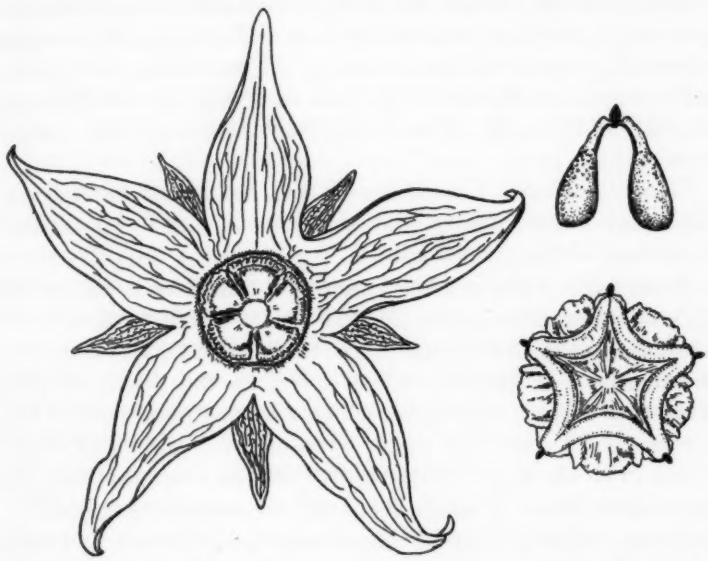

Fig. 1. *Gonolobus Allenii* Woods.: Flower, × 2; pollinia, × 10; gynostegium, × 5.

bilis. Rami gracili irregulariter pilosuli; internodiis valde variabilibus 4–20 cm. longis. Folia opposita petiolata; lamina ovato-oblonga apice super medium acute acuminata basi late rotundateque cordata, sinu ca. 1 cm. profundo lobis paulo incurvatis, 5–10 cm. longa 2–4 cm. lata membranacea viridis supra glabra, nervo medio basi 2-glanduloso subtus nervo medio venisque minute pilosulis; petiolis gracilibus 2.5–3.0 cm. longis densius minuteque pilosulis. Inflorescentia 1–3-flora; pedunculo 1.0–1.5 cm. longo sparse pilosulo; bracteis lanceo-

latis 0.1–0.3 cm. longis; pedicellis 2.0–2.5 cm. longis sparse pilosulis. Flores magni viridi; calycis laciniis anguste oblongo-lanceolatis sensim obtuse acuminatis 1.5 cm. longis extus sparse minutissimeque pilosulis; corolla ca. 5 cm. diam. rotata extus intusque minute papillata caeterumque glabra, lobis anguste ovato-lanceolatis super medium anguste acuminatis 2 cm. longis basi ca. 0.7 cm. latis patulis, faucibus leviter annulatis (an corona tertia?), corona exteriore breviter annulata leviter obtuseque 5-angulata integra fere glabra, interiore sub gynostegio pendente subreniformi, ca. 0.05 cm. lata, gynostegio subsessili, stigmate 5-gono plano ca. 0.5 cm. diam. Fructus ignoti.—COCLÉ: north rim of El Valle de Antón, alt. 800–1000 m., May 21, 1939, *P. H. Allen 1831* (Herb. Missouri Bot. Gard., TYPE).

Closely related to *G. uniflorus* HBK., but well marked by the somewhat larger, nearly glabrous corolla, and by structural characters of the gynostegium.

MARSDENIA TRIVIRGULATA Bartlett—HERRERA: vicinity of Chitré, alt. ca. 20 m., Nov. 26, 1938, *P. H. Allen 1092.* A most interesting addition to the flora of Panama, previously unknown south of Mexico. Allen describes the flower as pale pink, with stripes of purple, which are well preserved in our specimens. A duplicate of the type of *M. virgulata (Pringle 10,333* in Herb. Missouri Bot. Gard.) shows somewhat broader leaves than those of *Allen 1092,* and the corolla is completely glabrous within, whereas the Panama specimen, in ample flower, shows the corolla to be sparsely barbellate, particularly in the callose sinuses. In my estimation, however, these slight differences scarcely are varietal.

## CONVOLVULACEAE

*(P. C. Standley, Chicago)*

IPOMOEA **chiriquensis** Standl., sp. nov. Volubilis herbacea fere omnino glabra, caule in sicco ochraceo, internodiis elongatis; folia majuscula integra longi-petiolata membranacea, petiolo gracili 6–14 cm. longo; lamina late ovato-cordata 10–19 cm. longa 7–11.5 cm. lata subito contracta et anguste longi-acuminata vel fere caudata, acumine angusto usque 4.5 cm.

longo, basi profunde (2–3 cm.) cordata, sinu aperto, lobis posticis rotundatis, supra glabra, subtus fusco-punctata ad costam nervosque pilis paucis inconspicuis conspersa; pedunculi petiolum aequantes vel longiores cymose 2–6-flori ca. 14 cm. longi interdum apice foliati aliquanto fistulosi, pedicellis crassiusculis usque 5 cm. longis glabris; sepala in sicco subcoriacea inaequalia glabra, exterioribus oblongo-lanceolatis acuminatis 6–7 mm. longis erectis, interioribus ovalibus vel late ovatis 12–14 mm. longis breviter mucronatis; corolla glabra alba, tubo crasso 5 cm. longo sursum sensim dilatato, fauce 2 cm. lato, limbo 8 cm. lato vel ultra; stamina medium tubi aequantia.—CHIRIQUÍ: trail from Paso Ancho to Monte Lirio, upper valley of Río Chiriquí Viejo, alt. 1500–2000 m., Jan., 16, 1939, *P. H. Allen 1512* (Herb. Missouri Bot. Gard., TYPE; fragment in Herb. Field Mus.).

The species described is not closely similar to any of the numerous *Ipomoea* species of Mexico and Central America of which I have examined specimens, and the large, white corollas are a rather unusual character. Although the technical characters do not seem to warrant reference of the plant to *Calonyction,* there is a strong suspicion that when complete material of it has been collected, it will be found really referable to that group.

### HYDROPHYLLACEAE

WIGANDIA CARACASANA HBK.—CHIRIQUÍ: trail from Paso Ancho to Monte Lirio, upper valley of Río Chiriquí Viejo, alt. 1500–2000 m., Jan. 16, 1939, *P. H. Allen 1498.* Ranging from Mexico to Venezuela, but apparently not collected previously in Panama.

### VERBENACEAE

*(H. N. Moldenke, New York)*

LIPPIA OXYPHYLLARIA (Donn. Sm.) Standl.—CHIRIQUÍ: Llanos del Volcán, alt. ca. 1300 m., Jan. 23, 1939, *P. H. Allen 1541.* Previously known from two localities in Costa Rica.

LIPPIA TORRESII Standl.—CHIRIQUÍ: vicinity of Cerro Punta, alt. 2000 m., Jan. 21–24, 1939, *P. H. Allen 1565;* trail from Paso Ancho to Monte Lirio, upper valley of Río Chiriquí Viejo, alt.

1500–2000 m., Jan. 16, 1939, *P. H. Allen 1481*. Previously known from Costa Rica.

LIPPIA HEMISPHAERICA Jacq.—HERRERA: vicinity of Chitré, alt. ca. 20 m., Nov. 26, 1938, *P. H. Allen 1094*. Previously known from Colombia and Ecuador.

SOLANACEAE

*(P. C. Standley, Chicago)*

SOLANUM **chiriquinum** Standl., sp. nov. Arbor inermis 10–12-metralis, ramulis gracilibus teretibus ochraceis rimosis, novellis interdum plus minusve flexuosis densissime minute subadpresso-stellato-tomentulosis, internodiis brevibus; folia inter minora alterna vel interdum opposita atque valde inaequalia, breviter petiolata membranacea, petiolo 4–10 mm. longo stellato-tomentello; lamina lanceolato-oblonga 6–11 cm. longa 2–4 cm. lata sensim vel subito longe angusteque attenuato-acuminata, basi obtusa vel anguste rotundata, supra in sicco viridis sublucida, tantum ad costam sparse minute stellato-pubescens, aliter in statu adulto glabra, in statu juvenili sparse minuteque stellato-pilosula, subtus paullo pallidior ubique pilis minutis subadpressis stellato-tomentella, costa gracili prominente, nervis lateralibus utroque latere ca. 7 prominentibus obliquis angulo semirecto vel paullo latiore adscendentibus; lamina in foliis minoribus late ovata vel late elliptica 1–2 cm. tantum longa; inflorescentiae apice rami oppositifoliae pauci- vel multiflorae dichotomae 1–2.5 cm. longe pedunculatae, ramis vulgo 2 primo brevibus, serius valde elongantibus et usque 3.5 cm. longis vel ultra, ramis dense stellato-tomentulosis, pedicellis dense stellato-tomentosis usque 5 mm. longis; calyx fere 3 mm. longus extus dense minute stellato-tomentellus, lobis brevibus obtusis rotundato-ovatis erectis; corolla alba extus dense minute stellato-pilosula fere ad basin lobata, lobis patentibus acutis intus glabris ca. 4 mm. longis; antherae 2.5 mm. longae erectae oblongae apice late rotundatae.—CHIRIQUÍ: Río Chiriquí Viejo, valley near El Volcán, Aug. 10, 1938, *Peggy White 224* (Herb. Field Mus., TYPE; duplicate in Herb. Missouri Bot. Gard.).

Noteworthy for the forked inflorescences, whose branches at

first are very short but during anthesis gradually elongate. Only a few flowers, apparently, are open at a time, and most of them fall, leaving behind close-set scars along the rachis.

*(C. V. Morton, Washington, D. C.)*

SOLANUM ENCHYLOZUM Bitter—DARIEN: vicinity of Pinogana, Oct. 6, 1938, *P. H. Allen 930*. Previously known from Costa Rica.

SOLANUM GROSSULARIA Bitter—CHIRIQUÍ: upper Río Chiriquí Viejo Valley, April 5, 1938, *G. White 68*. Previously known from Guatemala, Costa Rica, and Colombia.

SOLANDRA BRACHYCALYX Kuntze—COCLÉ: El Valle de Antón, Dec. 8, 1938, *P. H. Allen 1212*. Previously known from Costa Rica.

SOLANUM EDWARDSII Standl.—CHIRIQUÍ: Río Chiriquí Viejo Valley, April 3, 1938, *G. White 60*. Previously known from Honduras and Costa Rica.

## LABIATAE

*(Carl Epling, Los Angeles)*

SALVIA **albopileata** sp. nov. Frutex altitudine ad 3 m. et ultra ramulis glabris purpureis tamen inter flores pilis glandulosis brevibus plus minusve viscidis; foliorum laminis ovato-lanceolatis 6–8 cm. longis, 3–4 cm. latis supra medium acuminatis, in basi angustatis, serrulatis, paginis ambabus glabris, inferiore glauca venulosa; petiolis 2–3 cm. longis; floribus 3–6 m. altis verticillastris bracteis ut videtur parvis hirtellis caducis subtentis, glomerulis inter se 5–10 mm. in spicis interruptis 8–15 cm. longis dispositis; calycibus florentibus rubris 12–13 mm. longis extus pilis brevioribus extensis mollibus glandulosis plus minusve viscidis, in maturitate paulo auctis; corollarum coccinearum tamen albopileatarum tubo 13 mm. longo, lateraliter compresso ventricoso, labia superiore 6 mm. alta.—CHIRIQUÍ: in cursus superioris fl. Chiriquí Viejo, 18. III. 1940, *P. White 321* (Herb. Univ. California, Los Angeles, TYPUS).

A member of the section *Cardinales* (species number 392a), which most nearly resembles *S. Wagneriana* of Guatemala and

Costa Rica. It is distinguished from that species by the smaller flowers, narrower leaves and finer pubescence. The corolla tubes of *S. Wagneriana* are 22–34 mm. long.

SCROPHULARIACEAE

*(F. W. Pennell, Philadelphia)*

CASTILLEJA **aurantiaca** Pennell, sp. nov. Caulis laxe ramosus, cinereus; folia 2.0–2.5 cm. longa, linearia, canescentia, distaliter lobata; bracteae latiores, oblanceolatae, aurantiacae; pedicelli 3–5 mm. longi; calyx 17–19 mm. longus, postice 1 mm., antice 9–12 mm. fissus, lateraliter bilobatus; corolla 12 mm. longa, decurva, galea gracillima tubo duplo longiore, labio anteriore brevissimo; capsula 9 mm. longa.

Stem laxly and widely branched, cinereous with dense spreading hairs. Leaves 2.0–2.5 cm. long, 1.5–2.0 mm. wide, canescent, 3-ribbed, distally with 1 or 2 pairs of slender lateral lobes (2–5 mm. long). Bracts oblanceolate, 1.5–2.0 cm. long, 3–4 mm. wide, obtuse-rounded, distally orange-yellow. Pedicels 3–5 mm. long, grayish-pubescent. Calyx 17–19 mm. long, spathaceous, cleft posteriorly 1 mm., laterally less deeply into lobes (of which posterior is triangular, anterior low and angled), and anteriorly over half-length (9–12 mm.). Corolla 12 mm. long, decurved: galea very slender, dorsally pubescent, about twice length of tube; lower lip very short, 1 mm. long, deep green. Capsule 9 mm. long.—CHIRIQUÍ: vicinity of Casita Alta, Volcán de Chiriquí, alt. 1500–2000 m., June 28–July 2, 1938, *Woodson, Allen & Seibert 926* (Herb. Acad. Nat. Sci. Philadelphia, TYPE; Herb. Missouri Bot. Gard., ISOTYPE).

CASTILLEJA **chiriquiensis** Pennell, sp. nov. Caulis laxe ramosus, cinereus; folia 1–2 cm. longa, linearia, canescentia, integra vel distaliter brevilobata; bracteae similes, rubrae; pedicelli 2–4 mm. longi; calyx 15–17 mm. longus, postice 1.5–2.5 mm., antice 10–14 mm. fissus, lateraliter fere integer; corolla 19–23 mm. longa, decurva, galea gracillima tubo multo longiore, labio anteriore brevissimo; capsula 8–9 mm. longa.

Stem laxly and widely branched, 5–10 dm. tall, cinereous with reflexed-spreading hairs. Leaves 1–2 cm. long, 1–2 mm. wide, canescent, obscurely 3-ribbed, entire or distally with a

pair of short lateral lobes (1–2 mm. long). Bracts similar, entire or slightly lobed distally, 0.7–1.5 cm. long, 1–2 mm. wide, nearly wholly red. Pedicels 2–4 mm. long, grayish-pubescent. Calyx 15–17 mm. long, spathaceous, cleft posteriorly 1.5–2.5 mm., laterally scarcely or not at all, the apex unlobed or with a much smaller and shorter anterior lobe, and anteriorly ⅔ to ⅘ length (10–14 mm.). Corolla 19–23 mm. long, decurved: galea slender, dorsally with fine white pubescence, nearly thrice length of tube; lower lip very short, 1 mm. long, deep green. Capsule 8–9 mm. long.—CHIRIQUÍ: Cuesta Grande, Volcán de Chiriquí, alt. 2600–3000 m., March 11–13, 1911, *W. R. Maxon 5307* (U. S. Nat. Herb., TYPE; Herb. Acad. Nat. Sci. Philadelphia, ISOTYPE).

Several other collections from this mountain are in the U. S. Nat. Herb.: by *Carl Sapper,* in April, 1899; upper belt of mountain, alt. 3000–3374 m., *H. Pittier 3088,* March 10–13, 1911; and rocky summit, alt. 3600 m., *E. P. Killip 3600,* Feb. 27, 1918.

CASTILLEJA **Seibertii** Pennell, sp. nov. Caulis strictus, 1.5–2.5 dm. altus, glaber vel minute pubescens; folia 1–2 cm. longa, glabra puberulentave, distaliter lobata; bracteae lobatae, coccineae, superioribus flabellatis; pedicelli 2–5 mm. longi; calyx 15–16 mm. longus, postice 1–2 mm., antice 10–12 mm. fissus, lateraliter integer; corolla 20–21 mm. longa, paulum decurva, galea crassa tubo duplo longiore, labio anteriore brevissimo; capsula 8–9 mm. longa.

Stems several from the perennial root, each strict, erect, 1.5–2.5 dm. tall, glabrous or finely retrorse-pubescent, herbaceous or suffrutescent. Leaves 1–2 cm. long, 1–1.5 mm. wide, glabrous or puberulent, pale and obscurely 3-ribbed beneath, distally with 1 or 2 pairs of slender lateral lobes (3–6 mm. long). Bracts leaf-like, more deeply lobed, the upper widened and somewhat flabellate, less than 1 mm. wide, nearly wholly scarlet or scarlet-red. Pedicels 2–5 mm. long, puberulent or finely pubescent. Calyx 15–16 mm. long, spathaceous, cleft posteriorly 1–2 mm., laterally not at all (the apex rounded or nearly truncate), and anteriorly ⅔ to ¾ length (10–12 mm.). Corolla 20–21 mm. long, slightly decurved: galea stout,

dorsally puberulent, nearly twice length of tube; lower lip very short, deep green, 1 mm. long, projecting. Capsule 8–9 mm. long.—CHIRIQUÍ: Loma Larga to summit, Volcán de Chiriquí, alt. above 2500 m., July 4–6, 1938, *Woodson, Allen & Seibert 1085* (Herb. Missouri Bot. Gard., TYPE; Herb. Acad. Nat. Sci. Philadelphia, ISOTYPE).

CASTILLEJA **bicolor** Pennell, sp. nov. Caulis 1.5–2 dm. altus, pubescens; folia 2.5–3.5 cm. longa, pubescentia, lobis linearibus pinnatifidis; bracteae superiores integrae, coccineae; pedicelli 3–7 mm. longi; calyx 18–19 mm. longus vel ultra, postice 1 mm., antice 14–15 mm. fissus, lateraliter integer; corolla matura non visa, forma *C. Seibertii* lata.

Stems several from the perennial root, each erect or decumbent, 1.5–2 dm. tall, pubescent with fine spreading hairs, herbaceous throughout. Leaves 2.5–3.5 cm. long, mid-blade 1–2 mm. wide, finely pubescent, obscurely or obsoletely 3-ribbed, with usually 2 pairs of linear lateral lobes (5–9 mm. long). Bracts leaf-like, the upper narrowly oblanceolate and entire, distally or nearly wholly scarlet. Pedicels 3–7 mm. long, grayish-pubescent. Calyx at least 18–19 mm. long (not seen mature), spathaceous, cleft posteriorly 1 mm., laterally not at all (the apex ovate-rounded or with slight and shorter anterior lobe), and anteriorly ¾ to ⅘ length (14–15 mm.). Corolla similar to that of *C. Seibertii*, apparently included within calyx, but not seen mature.—CHIRIQUÍ: Loma Larga to summit, Volcán de Chiriquí, July 4–6, 1938, *Woodson, Allen & Seibert 1035* (Herb. Missouri Bot. Gard., TYPE; Herb. Acad. Nat. Sci. Philadelphia, ISOTYPE).

I hesitate to describe a new species of *Castilleja* from immature material, but am induced to do so by the apparent constancy of the characters distinguishing it from *C. Seibertii*. The corolla will undoubtedly be that usual to this well-marked section of the genus. The name is suggested by the field record that the foliage is purple, thus contrasting with the scarlet bracts.

The following species of *Castilleja*, so far the only ones known from Panama, may be distinguished by the key below:

A. Calyx cleft equally posteriorly and anteriorly; pedicels less than 1 mm. long; leaf-blades entire or nearly so; root annual.....1. *C. communis* Benth.
AA. Calyx cleft much more deeply anteriorly than posteriorly; pedicels becoming 3–12 mm. long; root perennial.
B. Stems widely branched, woody below, canescent-pubescent; leaves with lobes less than ¼ length of blade; bracts entire; plants taller.
C. Bracts orange-yellow, oblanceolate, wider than the upper leaves .....2. *C. aurantiaca* Penn.
CC. Bracts red, nearly linear, no wider than the upper leaves..... .....3. *C. chiriquiensis* Penn.
BB. Stems strict, little branched, herbaceous or suffrutescent, finely pubescent to glabrous; leaves with lobes more than ¼ length of blade; plants low, 1–2 dm. tall.
C. Leaves 1–2 cm. long, with short obtusely rounded lobes; bracts red, the upper triangular-obovate, lobed; leaves and stem hirtellous to glabrate, slightly glutinous, the latter suffrutescent; corolla slightly exserted.....4. *C. Seibertii* Penn.
CC. Leaves 2.5–3.5 cm. long, with slender obtuse or obtusish lobes; bracts scarlet, the upper narrowly oblanceolate, entire; leaves and stem finely cinereous-pubescent or puberulent, the latter herbaceous throughout; corolla apparently included within calyx (but perhaps not seen mature).....5. *C. bicolor* Penn.

## GESNERIACEAE

*(C. V. Morton, Washington, D. C.)*

Besleria acropoda Donn. Sm.—coclé: north rim of El Valle de Antón, trail to San Miguel, May 21, 1939, *P. H. Allen 1829*. Previously known only from the type from Costa Rica.

## LENTIBULARIACEAE

*(J. H. Barnhart, New York)*

Pinguicula crenatiloba DC.—coclé: moist shaded banks, vicinity of El Valle, alt. 800–1000 m., Sept. 5, 1938, *P. H. Allen 754*. Previously known from southern Mexico and Guatemala. Specimens of a larger-flowered species collected near the summit of Volcán de Chiriquí by Woodson, Allen & Seibert were destroyed in the disastrous fire of 1937.

## RUBIACEAE

*(P. C. Standley, Chicago)*

Alibertia garapatica Schum.—panamá: Río Las Lajas, alt. 20 m., Feb. 5, 1939, *P. H. Allen 1616*. Previously known from northern Colombia and Panama, but sufficiently rare to merit recording.

TOBAGOA MALEOLENS Urban—COCLÉ: north rim of El Valle de Antón, alt. 600–1000 m., Feb. 12, 1939, *P. H. Allen 1666*. This monotypic genus has previously been known only from Tobago and Venezuela.

BORRERIA **pumilio** Standl., sp. nov. Herba annua tenuis 4–6 cm. alta simplex vel superne pauciramosa, caule gracillimo sparse minute strigilloso vel fere glabro paribus ca. 4 foliorum onusto; stipulae fere 1 mm. longae multisetosae; folia linearia sessilia 3–6 mm. longa acuta basin versus paullo angustata glabra vel minute sparseque scaberula patentia; flores capitati, capitulo terminali sessili 4–5 mm. diam. paucifloro, bracteis linearibus 6–9 mm. longis patentibus vel subreflexis, floribus arcte sessilibus; capsula late subglobosa ca. 1 mm. longa glabra, sepalis linearibus viridibus erectis capsula paullo longioribus glabris vel obscure ciliolatis; corolla alba sepalis paullo longior, antheris exsertis.—COCLÉ: Natá, alt. 50 m., Sept. 12, 1938, *P. H. Allen 822* (Herb. Field Mus., TYPE; duplicate in Herb. Missouri Bot. Gard.).

This diminutive plant is altogether unlike any other species known previously from Central America. It is similar to several annual species of *Borreria* found in South America but differs from each of them in some important respect.

PSYCHOTRIA **Allenii** Standl., sp. nov. Arbor 8-metralis, trunco usque 25 cm. diam., omnino glabra, ramulis crassis subteretibus vel obtuse tetragonis, internodiis vulgo elongatis ad nodos plus minusve incrassatis; stipulae persistentes atque basi incrassatae inferne in vaginam campanulatam ca. 4 mm. longam connatae, lobis utroque latere 2 triangularibus acutis vel acuminatis erectis vaginae aequilongis vel paullo longioribus; folia mediocria breviter petiolata crasse membranacea, petiolo 12–18 cm. longo gracili vel crassiusculo; lamina late ovata usque elliptica vel elliptico-oblonga 9–16 cm. longa 3.5–9 cm. lata abrupte breviter acuminata, acumine ipso acuto, basi obtusa vel rarius acuta, interdum fere rotundata, supra in sicco fusco-olivacea, costa nervisque subprominentibus, sublucida, subtus fere concolor, costa gracili elevata, nervis lateralibus utroque latere ca. 9 teneris arcuatis angulo lato adscendenti-

bus, venulis prominulis laxe reticulatis; inflorescentia terminalis cymoso-paniculata 2.5–5.5 cm. longe pedunculata multiflora aperte ramosa usque 6 cm. longa atque 8 cm. lata, ramis infimis ut ceteri radiatim divaricatis crassis basi bracteatis, bracteis anguste triangulari-lanceolatis longi-attenuatis patentibus persistentibus, floribus sat dense aggregatis sessilibus vel brevissime crasseque pedicellatis albis; hypanthium crasse columnare ca. 0.7 mm. longum, calyce breviter dentato-lobulato, dentibus rotundato-ovatis vix ultra 0.3 mm. longis obtusis; corolla 5 mm. longa extus glabra in alabastro apice rotundata, lobis oblongis tubo duplo longioribus.—COCLÉ: north (wet) rim, vicinity of El Valle, alt. 600–1000 m., May 14, 1939, *P. H. Allen 1796* (Herb. Field Mus., TYPE; duplicate in Herb. Missouri Bot. Gard.); BOCAS DEL TORO: Cricamola, region of Almirante, Jan.–March, 1928, *G. Proctor Cooper 522.*

Like the majority of *Psychotria* species, this one has no outstanding distinctive characters. It is, however, unlike any other known from Central America.

RONDELETIA **platysepala** Standl., sp. nov. Arbor 6-metralis ut videtur dense ramosa, ramis gracilibus teretibus fusco-ferrugineis, internodiis brevibus, novellis sparse vel dense strigosis; stipulae persistentes triangulares 2–3 mm. longae subulato-acuminatae erectae; folia parva breviter petiolata membranacea, petiolo gracili 3–5 mm. longo strigoso; lamina lanceolato-oblonga vel elliptico-oblonga 5–8 cm. longa 1.5–3 cm. lata longe anguste attenuato-acuminata, basi acuta vel acuminata, supra in statu adulto glabra vix lucida, subtus paullo pallidior in statu adulto tantum ad costam nervosque strigosa, in statu juvenili pilis longis mollibus albidis sat dense sericea sed cito glabrescens, costa gracili prominente, nervis lateralibus utroque latere ca. 7 prominulis valde obliquis, venis fere obsoletis; inflorescentia terminalis cymoso-paniculata sublaxe multiflora 4–7 cm. longa atque aequilata longi-pedunculata, ramis gracilibus adpresso-pilosis adscendentibus, bracteis minutis, pedicellis usque 4 mm. longis adpresso-pilosis, saepe fere nullis; hypanthium clavato-oblongum 2–2.5 mm. longum pilis albidis longis subadpressis pilosum; calyx ad basin 4-

partitus, segmentis foliaceis inaequalibus ellipticis vel late ovatis 3–4 mm. longis patentibus obtusis utrinque sparse pilosis; corolla pallide rosea extus pilis longis albidis subadpressis dense pilosa, tubo gracili 10 mm. longo sursum paullo dilatato, lobis 4 patentibus suborbicularibus 2 mm. longis intus glabris, fauce glabro.—COCLÉ: north (wet) rim, vicinity of El Valle, alt. 600–1000 m., May 14, 1939, *P. H. Allen 1791* (Herb. Field Mus., TYPE; duplicate in Herb. Missouri Bot. Gard.).

The Panama plant is a relative of the Costa Rican *R. calycosa* Donn. Smith, which has a larger corolla and longer calyx lobes.

**ALLENANTHUS** Standl., gen. nov.

Arbores erectae sparse puberulae vel fere glabrae, ramulis teretibus, internodiis elongatis; stipulae latae ovatae fere liberae cuspidatae plus minusve persistentes vel deciduae; folia opposita breviter petiolata membranacea; flores parvi cymoso-corymbosi graciliter pedicellati, inflorescentia magna terminalis foliata; hypanthium truncato-obovoideum obcompressum anguste bialatum, calyce parvo 4-lobato, lobis ovato-triangularibus obtusis erectis persistentibus; corolla non visa; discus non elevatus; ovarium biloculare, ovulis in loculo solitariis ab apice loculi pendulis; fructus ut videtur siccus, loculis parvis oblongis centralibus ala marginali lata spongiosa compressa circundatis, fructu toto in ambitu elliptico-obovato apice late rotundato vel subtruncato, basi acuto; semina pendula lateraliter paullo compressa.

Type species, *Allenanthus erythrocarpus* Standl.

**Allenanthus erythrocarpus** Standl., sp. nov. Arbor 10-metralis, ramulis subgracilibus teretibus fusco-brunnescentibus laevibus in statu adulto glabris, novellis ut videtur bifariam puberulis, internodiis 3–4 cm. longis, infra nodos paucilenticellatis, lenticellis parvis pallidis elevatis; stipulae 5–6 mm. longae brunneae vel ferrugineae e basi late triangulari-ovata subito longiuscule cuspidatae, subpersistentes; folia breviter petiolata membranacea in sicco fusca, petiolo sat gracili 7–10 mm. longo superne anguste canaliculato atque puberulo; lamina lanceolato-oblonga vel oblongo-ovata 9–11

cm. longa 3–5 cm. lata longiuscule angusteque acuminata, basi acuta, supra glabra vel glabrata opaca, nervis venisque obscuris non elevatis, subtus concolor fere glabra sed in axibus nervorum primariorum breviter denseque albo-barbata, costa gracili elevata, nervis lateralibus utroque latere 5–6 arcuatis angulo latiusculo adscendentibus tenerrimis vix prominulis prope marginem irregulariter conjunctis, venis inconspicuis laxe reticulatis; inflorescentia terminalis dense foliata sessilis atque dense ramosa, ca 13 cm. longa et 15 cm. lata, ramulis brevibus ternatis bifariam breviter patulo-pilosis; bracteae parvae lineari-subulatae persistentes; pedicelli in statu fructifero gracillimi fere filiformes glabri plerumque 3–5 mm. longi erecti; calycis lobuli vix 1 mm. longi in statu fructifero incurvi glabri; fructus valde obcompressus ca. 8 mm. longus atque 5–6 mm. latus glaber coccineus, parte seminifera 2–2.5 mm. longa trinervia.—COCLÉ: vicinity of Valle de Antón, alt. about 600 m., Sept. 17, 1939, *P. H. Allen 1999* (Herb. Field Mus., TYPE; duplicate in Herb. Missouri Bot. Gard.).

Quite naturally, it always is a surprise, and sometimes a pleasant one, when examining a new lot of material received for determination to come suddenly upon an altogether new plant, from a region with which one is fairly familiar. It is much more of a surprise when the plant belongs to a family with which one has worked more or less intensively, at least if the plant is altogether unlike anything with which one is familiar. The plant here described is such a one. In fact, at first glance it did not recall any member of the Rubiaceae, but rather by the gross aspect of the dried specimens certain South American Polygonaceae, a resemblance that it must be confessed is soon dissipated by a second glance.

It is unfortunate that corollas are not available for examination, since they probably, although not necessarily, would facilitate a more exact reference of the plant to its proper position within the Rubiaceae. It seems to belong definitely to the tribe Chiococceae, where it may be associated with *Chiococca, Placocarpa,* and *Asemnanthe.* The texture of the leaves is considerably thinner than that of most members of this tribe, and the terminal inflorescence also is unusual in the group.

The most distinctive character of the plant is found in the peculiar fruit, which is not closely similar to that of any other genus of Rubiaceae. It is evidently obcompressed, and appears not to have been juicy in the living state, as in *Chiococca*, whose fruit dries in a rather similar manner. The central, seed-bearing part of the fruit is very small, but is surrounded by a broad, thick and rather spongy or corky wing, which *may* have been somewhat succulent in the living state. It is noteworthy that although the small fruits are exceedingly abundant in the large panicles, only a small proportion of the flowers mature, the number of withered, undeveloped or sterile flowers being much greater.

The genus is dedicated to Paul H. Allen, who has done exceptionally good and profitable collecting in Panama, over a period of several years. His carefully selected material has added many species to the recorded flora of the country.

## VALERIANACEAE

*(P. C. Standley, Chicago)*

VALERIANA **Woodsonii** Standl., sp. nov. Herba perennis ca. 20 cm. alta caespitosa, radicibus carnosis incrassatis fasciculatis, basibus foliorum ad basin caulis persistentibus; caulis simplex scapiformis crassiusculus glaber paribus foliorum 3–4 onustus, foliis alteris ex apice radicis nascentibus; folia pinnata, radicalia usque 9 cm. longa, superiora 3.5–6 cm. longa, glabra, petiolo crasso prope basin villosulo; foliola 3–11, terminalia petiolulata ovalia vel ovali-ovata et usque 2 cm. longa, lateralia sessilia basin versus folii decrescentia late elliptica vel rotundata 3–8 mm. longa, omnia apice obtusa vel interdum rotundata, rare subacuta, inaequaliter crenato-dentata vel rare subintegra, tenuia; inflorescentia terminalis capitato-congesta dense multiflora 2 cm. lata longi-pedunculata, bracteis oblongis vel oblongo-spathulatis ciliatis obtusis vel rotundatis, exterioribus breviter lobatis; corolla pallide rosea glabra, tubo crasso 3.5 mm. longo, lobis rotundatis vix ultra 1 mm. longis; stamina exserta.—CHIRIQUÍ: Loma Larga to summit, Volcán de Chiriquí, alt. 2500–3380 m., July 4–6, 1938, *R. E. Woodson, Jr., P. H. Allen & R. J. Seibert 1043* (Herb. Field Mus., TYPE;

duplicate in Herb. Missouri Bot. Gard.); Potrero Muleto, Volcán de Chiriquí, July 18, 1938, *M. E. Davidson 1023* (Herb. Field Mus.).

Presumably this is another of the endemics restricted to the slopes of the Volcán de Chiriquí. Among the few species of *Valeriana* known from Central America it has no close relative.

## CAMPANULACEAE (LOBELIOIDEAE)[1]

*(Rogers McVaugh, Washington)*

LOBELIA CARDINALIS L., subsp. **graminea** (Lamarck) comb. nov. *(L. graminea* Lam., Encyc. **3**: 583. 1791)—CHIRIQUÍ: vicinity of El Valle de Antón, *Allen 1984;* Finca Lérida to Boquete, *Woodson, Allen & Seibert 1096;* PANAMÁ: San Carlos, *Allen 1144;* Río Las Lajas, *Allen 1619;* CANAL ZONE: Miraflores Lake, *Gene White 155.*

The type locality for *Lobelia graminea* is given as "Perou," but there is no known occurrence of any indigenous cardinal flower in South America, and the type, collected by Joseph de Jussieu and now in the Muséum National d'Histoire Naturelle, Paris, exactly matches modern collections from Panama. De Jussieu is known to have left Europe in 1735, accompanying an astronomical expedition which was bound for western South America. He stopped at Martinique and Santo Domingo, then crossed the isthmus of Panama and sailed to Guayaquil (see Lamarck Encyc. **8**: 730. 1808). He spent about 35 years in South America, passing much of the time in Peru. It seems clear that the type of *Lobelia graminea* was actually collected during the trip across Panama in 1735 or 1736 and later attributed erroneously by Lamarck to Peru.

This is the commonest lobelia in Panama, ranging at least as far east as the Canal Zone, and found at various elevations, from sea-level to at least 1550 m. The plant found in Panama comprises a single well-marked variety which ranges throughout Central America to southern Mexico.

*Lobelia Cardinalis* of Linnaeus is confined to eastern United States and Canada. It may be designated as LOBELIA CARDI-

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NALIS subsp. **Cardinalis**, nom. nov. Its western congener, ssp. *graminea*, ranges from Nebraska to California, western Texas and south throughout Mexico and Central America. The western subspecies is extremely variable and may be divided into at least four well-marked geographical varieties, as follows:

A. Plants glabrous or sparsely pubescent, never densely short-pubescent throughout; leaves mostly 8 to 14 times as long as wide, linear to linear-lanceolate or the lower oblanceolate.....B
B. Leaves entire or very nearly so, often subcoriaceous, the bases often broad and subauriculate; inflorescence usually ample, scarcely if at all pedunculate.....1. var. *graminea*
B. Leaves finely and evenly to coarsely and irregularly dentate, rarely subentire, not at all coriaceous, the blades plainly narrowed to the base, not at all subauriculate; inflorescence usually short, appearing pedunculate .....2. var. *pseudosplendens*
A. Plants densely pubescent to nearly glabrous; leaves mostly 5 to 8 times as long as wide, lanceolate to oblong or ovate; inflorescence usually ample, often leafy.....C
C. Plants densely short-pubescent throughout (hypanthium sometimes glabrous); leaves mostly obscurely toothed or subentire.....3. var. *multiflora*
C. Plants glabrous or sparsely pubescent; leaves usually plainly toothed.. .....4. var. *phyllostachya*

1. var. **graminea** nom. nov. A word should be inserted as to the system of nomenclature followed here by the writer. Instead of using "typica" or other similar adjectives to designate the original nomenclatorial form of the species, the specific name is used again in the subspecific category. Presumably such a name should be non-transferable, so that if a species were transferred to a new genus, the subspecific adjective would change to correspond with that of the valid specific name of the plant in that genus. In the present case, the name ssp. *graminea*, var. *graminea* indicates that the variety in question is the same as the nomenclatorial type of the subspecies, that is, typical *Lobelia graminea* Lam. The range is from Panama to Chiapas, Hidalgo and Mexico.

2. var. **pseudosplendens**, var. nov.; foliis dentatis, non coriaceis, linearibus lanceolatisve, basi angustatis; spicis brevibus, pedunculatis.—MEXICO: CHIHUAHUA: 12 miles northeast of Bella Vista, Mun. de Madera, Oct. 9, 1939, *C. H. Muller 3707* (Herb. U. S. Nat. Arb., TYPE). The range is from extreme

western Texas to California, south to Chihuahua and sparingly as far as Oaxaca.

3. var. **multiflora** (Paxt.) comb. nov. *(L. fulgens* var. *multiflora* Paxt., Paxt. Mag. **15**: 7. 1849). The type locality is unknown; the name was based upon plants of horticultural origin. This densely pubescent variety is taken to be identical with *L. fulgens* Willd. The range is from western Texas to British Honduras and Guatemala, chiefly along the eastern Sierra Madre, but very sparingly west to California.

4. var. **phyllostachya** (Engelm.) comb. nov. *(Lobelia phyllostachya* Engelm., in Wisliz. Mem. Tour North. Mex. 108. 1848). —MEXICO: "swamps between Monterey and Cerralbo," May 28, 1847, *Wislizenus 337* (Herb. Missouri Bot. Gard., TYPE). The range is from Nebraska to central and western Texas, west to Sonora and southern Nevada, south (chiefly at low elevations along the eastern coast of Mexico) to Honduras and Tabasco.

LOBELIA LAXIFLORA HBK. var. MOLLIS (Vatke) Zahlbr.—CHIRIQUÍ: valley of the Río Chiriquí Viejo, *Gene White 78;* same, near El Volcán, *Peggy White 236;* Casita Alta, Volcán de Chiriquí, *Woodson, Allen and Seibert 872;* COCLÉ: El Valle, *Allen 1779.*

*L. laxiflora,* which ranges almost throughout Mexico and Central America, north to southern Arizona and south to Colombia, is an exceedingly variable species. At least four varieties may be recognized, as follows:

A. Leaves linear-lanceolate, averaging 10 times as long as wide; plants glabrous or essentially so, often purplish; pedicels appressed to the stem, at least at base; a plant of the highlands of the Mexican Plateau, from Oaxaca to Baja California and Arizona.....var. ANGUSTIFOLIA A. DC.

A. Leaves broader, usually 3 to 5 times as long as wide; plants glabrous to tomentose, rarely if ever purplish; pedicels various.....B

B. Flower-bracts conspicuously smaller than the foliage-leaves; leaves broad, mostly about 3 times as long as broad; inflorescence often compact, averaging not more than 20 cm. in length; a plant of the west coast of Mexico, from Sonora to Chiapas..var. **Nelsoni** (Fern.), comb. nov. *(Lobelia Nelsoni* Fern., Proc. Amer. Acad. **36**: 503. 1901)

B. Flower-bracts as large as the foliage-leaves or nearly so, and essentially identical with them; leaves averaging 5 times as long as wide but often wider than this; inflorescence various, often long.....C

C. Pedicels lax, loosely spreading from the base; plants glabrous or sparsely pubescent; range from Guatemala and Honduras to Vera Cruz and Puebla.....var. **laxiflora** nom. nov. (*Lobelia laxiflora* HBK., Nov. Gen. & Sp. 3: 311 [p. 242 of folio edition]. 1819)

C. Pedicels stiff, closely and prominently appressed to the stem, at least at base; plants (rarely glabrous) slightly to densely pubescent; range from Michoacan and Jalisco throughout Central America to Colombia....var. MOLLIS (Vatke) Zahlbr., Rep. Sp. Nov. 14:185. 1915 (*Lobelia persicaefolia* var. *mollis* Vatke, Linnaea 38: 722. 1874)

All collections of this species from Panama seen by the writer are to be referred to var. *mollis*. *Allen 1779* is a glabrous phase of this variety, easily distinguished from var. *laxiflora* by the appressed pedicels and from var. *angustifolia* by the width of the leaves. This phase occurs sparingly throughout Central America.

LOBELIA IRASUENSIS Pl. & Oerst.—CHIRIQUÍ: valley of the upper Río Chiriquí Viejo, *Peggy White 59a;* Loma Larga to summit of Chiriquí, *Woodson, Allen & Seibert 1031.* Also collected on Volcán de Chiriquí by Pittier *(3072)* in 1911. Unknown in Panama except in the neighborhood of Chiriquí, but occurs on several high mountains in Costa Rica.

LOBELIA LONGICAULIS Brandegee *(L. urticifolia* E. Wimm.; *L. neglecta* Vatke, non R. & S.).—CHIRIQUÍ: Finca Lérida to Boquete, *Woodson, Allen & Seibert 1119.* Apparently not previously reported from Panama. Widely distributed from Morelos, Mexico, and Michoacan to Costa Rica.

CENTROPOGON GRANULOSUS Presl *(C. cuspidatus* A.DC., *C. nutans* Pl. & Oerst.)—CHIRIQUÍ: vicinity of "New Switzerland," *Allen 1420;* Casita Alta, Volcán de Chiriquí, *Woodson, Allen & Seibert 844;* El Volcán to Cerro Punta, *Gene White 13;* COCLÉ: El Valle, *Allen 1213.*

This species has not been reported heretofore from North America, all North American material having previously been referred to *C. nutans.* Examination of a large series of herbarium specimens indicates that individuals from Costa Rica and Panama are conspecific with those of a common Andean plant which ranges as far south as central Bolivia. The earliest name applied to this species is apparently *C. granulosus;* Presl's description seems to apply to the species in question, but the

writer has been unable to locate the type. Wimmer (Rep. Sp. Nov. **29**: 67. 1931) refers *C. cuspidatus* to *C. granulosus*, and although the writer has not seen the type of the former, it was


Fig. 2. Distribution of *Centropogon granulosus* Presl.

examined in Paris by Dr. H. A. Gleason of the New York Botanical Garden, and his notes and tracings indicate that it represents the species here considered.

CENTROPOGON FERRUGINEUS (L. f.) Gleason, var. **venezuelanus** (E. Wimm.) comb. nov. *(C. affinis var. venezuelanus*

E. Wimm., Rep. Sp. Nov. **19**: 242. 1924)—CHIRIQUÍ: Casita Alta, Volcán de Chiriquí, *Woodson, Allen & Seibert 845.* New to Panama.

Typical *C. ferrugineus,* from the region of Bogotá, is a small-leaved plant with dark-tawny pubescence, the leaves usually not exceeding 2 cm. in width. In var. *venezuelanus* the leaves are typically 2 to 5 cm. wide, and the pubescence is yellow to yellow-brown and never dark-tawny; in other respects the plants appear to be identical with typical *C. ferrugineus.* The distribution of var. *venezuelanus* is from northwestern Ecuador to Panama and western Venezuela. It is not more than varietally distinct from the plant which has been known as *C. costaricanus* Pl. & Oerst., and which differs only by having more abruptly pointed leaves and by the light grey-brown rather than yellowish hairs. The latter may now be known as CENTROPOGON FERRUGINEUS var. **costaricanus** (Pl. & Oerst.) comb. nov. *(C. costaricanus* Pl. & Oerst., Kjoeb. Vidensk. Meddel. 156. 1857; *C. affinis* var. *costaricanus* A. Zahlbr., Ann. K. K. Naturh. Hofmus. Wien **6**: 437. 1891).

CENTROPOGON MACROPHYLLUS (G. Don) E. Wimm., var. **congestus** (Gleason) comb. nov. *(C. congestus* Gleason, Bull. Torr. Bot. Club **52**: 52. 1925; *C. diocleus* E. Wimm., Ann. Mo. Bot. Gard. **24**: 209. 1937)—CHIRIQUÍ: vicinity of "New Switzerland," *Allen 1393;* Bajo Mona, mouth of Quebrada Chiquero, along Río Caldera, *Woodson, Allen & Seibert 1021.*

*Centropogon diocleus,* previously thought to be endemic in the province of Chiriquí, turns out to be identical with *C. congestus,* which was described from the Department of Caldas, Colombia, and is relatively frequent along the Andes of Colombia at elevations of 1400 to 2200 m. The writer has not seen the type of *C. macrophyllus (Siphocampylus macrophyllus* G. Don), but follows Wimmer's interpretation of this species; the plant of Colombia and Panama here discussed as var. *congestus* differs from typical *C. macrophyllus* of Peru and Bolivia only by a somewhat greater degree of pubescence and by the slightly larger and more irregular teeth of the leaf-blades.

CENTROPOGON **radicans** (O. Ktze.) comb. nov. (*Siphocampylus radicans* O. Ktze., Rev. Gen. Pl. **2**: 381. 1891; *S. roseus* Donn. Sm., Bot. Gaz. **23**: 249. 1897, non *Centropogon roseus* Rusby, Bull. N. Y. Bot. Gard. **8**: 123. 1912; *Centropogon coccineus* auth., non *Siphocampylus coccineus* Hook.)—COCLÉ: El Valle, *Allen 1214*. This is a lowland species of Costa Rica and Panama. Kuntze's type, labelled "Costarica, 1000′," is now in the New York Botanical Garden. The species was referred in the "Flora of Costa Rica" (Field Mus. Publ. Bot. **18**[4]: 1410. 1938) to *C. coccineus*.

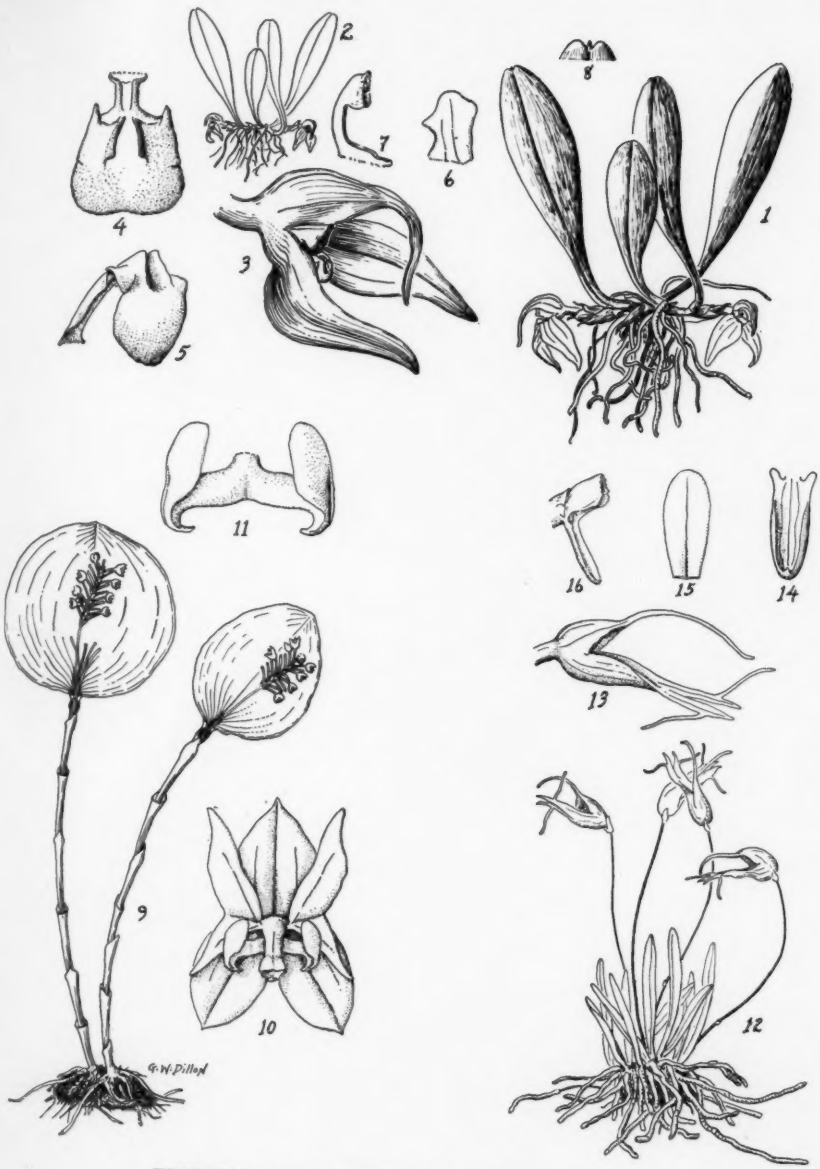
## EXPLANATION OF PLATE

### PLATE 31

Figs. 1–8. *Masdevallia simula* Rchb. f.: fig. 1, plant, × 2; fig. 2, plant, × 1; fig. 3, flower, × 5; fig. 4, lip spread out, × 10; fig. 5, lip in natural position, × 10; fig. 6, petal, × 5; fig. 7, column and column-foot, × 5; fig. 8, apex of leaf, × 5.—Drawn from *Allen 2115*.

Figs. 9–11. *Lepanthes rotundifolia:* fig. 9, plant, × 1; fig. 10, flower, × 5; fig. 11, lip, × 10.—Drawn from the type.

Figs. 12–16. *Masdevallia Allenii:* fig. 12, plant, × 1; fig. 13, flower, from the side, × 2; fig. 14, lip, × 5; fig. 15, petals, × 10; fig. 16, column and column-foot, × 10.—Drawn from the type.



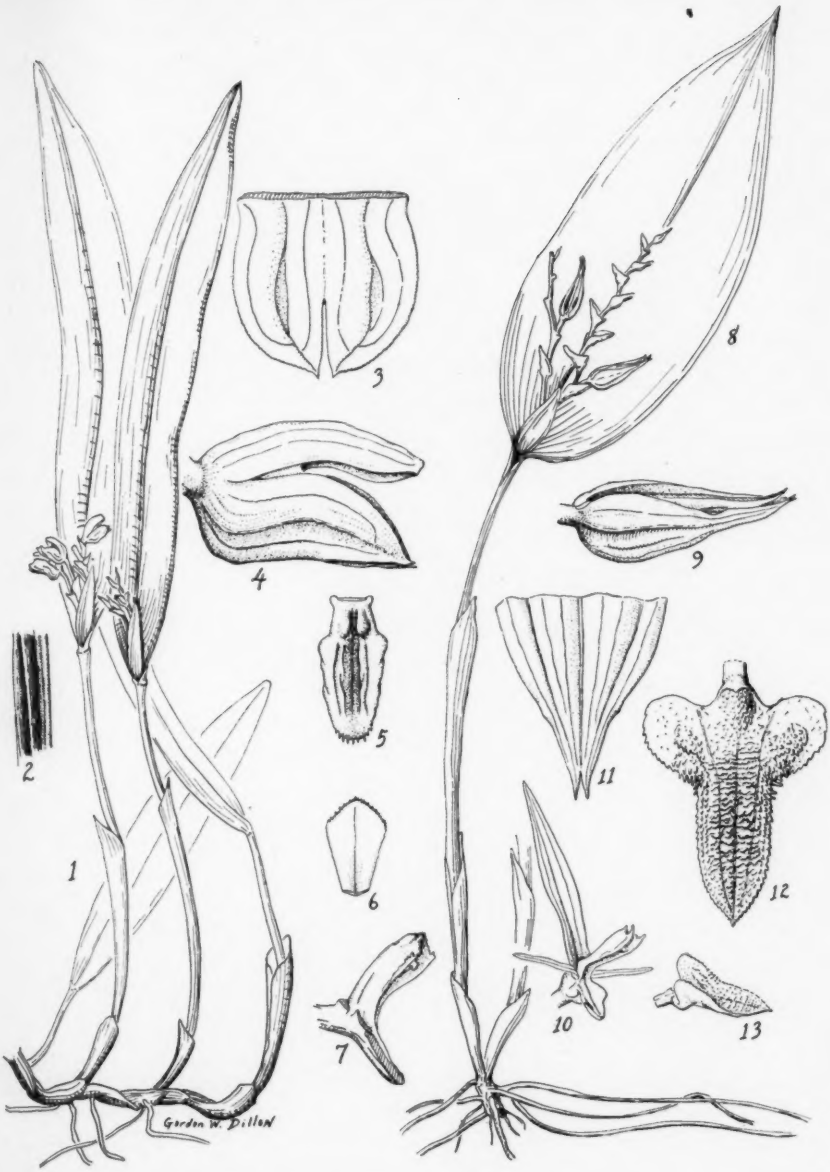

WOODSON AND SCHERY—FLORA OF PANAMA

## Explanation of Plate

### PLATE 32

Figs. 1–7. *Pleurothallis pterocaulis:* fig. 1, plant, × 1; fig. 2, section of stem enlarged to show wings; fig. 3, lateral sepals, × 5; fig. 4, flower from the side, × 5; fig. 5, lip from above, × 5; fig. 6, petal, × 5; fig. 7, column and column-foot, × 5.—Drawn from the type.

Figs. 8–12. *Pleurothallis lepidota:* fig. 8, plant, × 1; fig. 9, flower from the side, × 2; fig. 10, flower to show dorsal sepal, petals, column and column-foot, × 2; fig. 11, lateral sepals, × 2; fig. 12, lip from above, × 5; fig. 13, lip from the side, × 2.—Drawn from the type.




WOODSON AND SCHERY—FLORA OF PANAMA

## EXPLANATION OF PLATE

### PLATE 33

Figs. 1–4. *Pleurothallis hispida:* fig. 1, plant, × 1¼; fig. 2, flower from the side, × 3¾; fig. 3, lip from above, × 8¾; fig. 4, petal, × 6¼.—Drawn from the type.

Figs. 5–7. *Pleurothallis Allenii:* fig. 5, plant, × 1¼; fig. 6, flower from the front, × 2½; fig. 7, lip from above, × 10.—Drawn from the type.

Figs. 8–10. *Pleurothallis simulans:* fig. 8, plant, × 1¼; fig. 9, flower from the front, × 2½; fig. 10, lip from above, × 9½.—Drawn from the type.

Figs. 11–15. *Pleurothallis calyptrostele:* fig. 11, plant, × 3⅛; fig. 12, column, column-foot and lip from the side, × 6¼; fig. 13, dorsal sepal, × 6¼; fig. 14, lateral sepals, × 6¼; fig. 15, petal, × 6¼.—Drawn from *Allen 1237*.

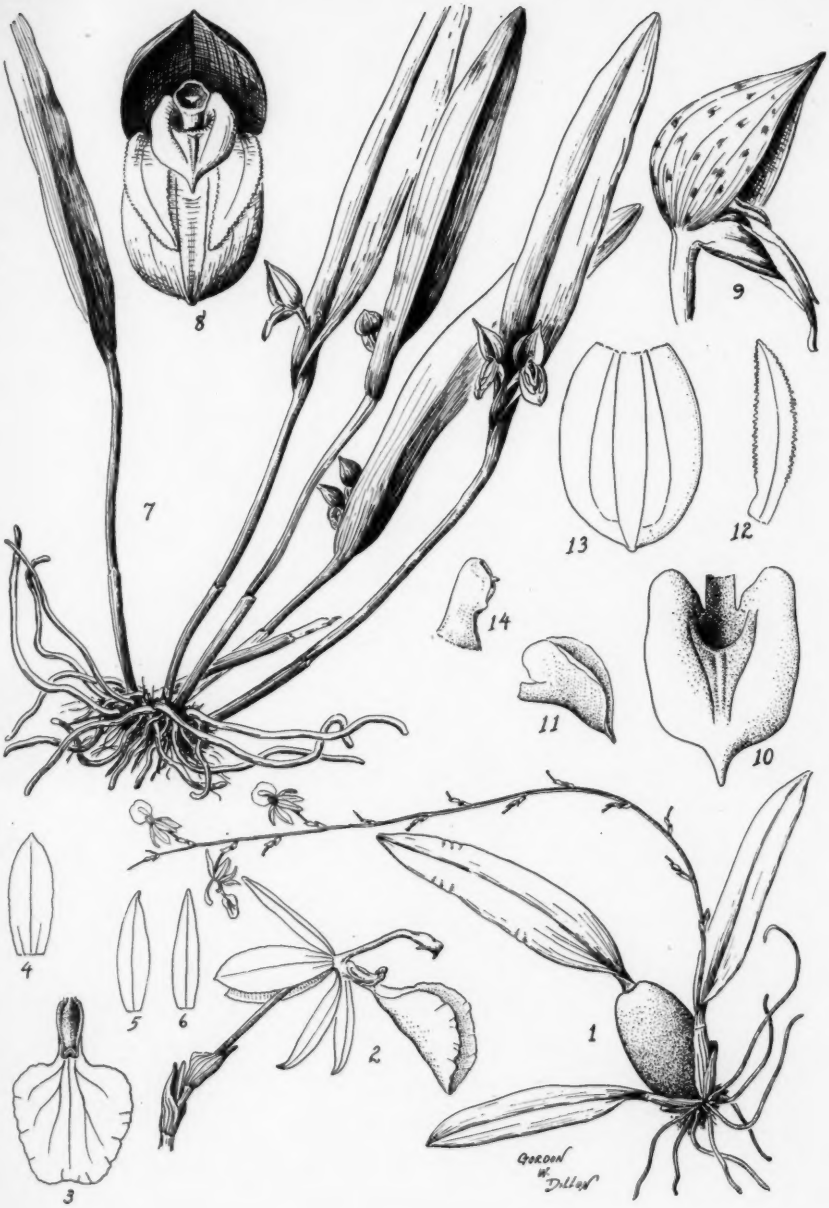

WOODSON AND SCHERY—FLORA OF PANAMA

## EXPLANATION OF PLATE

### PLATE 34

Figs. 1–6. *Sigmatostalix abortiva:* fig. 1, plant, ×1⅛; fig. 2, flower from side, × 5½; fig. 3, lip from above, × 5½; fig. 4, petals, × 5½; fig. 5, lateral sepal, × 5½; fig. 6, dorsal sepal, × 5½.—Drawn from the type.

Figs. 7–14. *Pleurothallis cobracformis:* fig. 7, plant, × 1⅛; fig. 8, flower from the front, natural position, × 4½; fig. 9, flower from the side, natural position, × 4½; fig. 10, lip spread out, × 9; fig. 11, lip from the side, natural position, × 5½; fig. 12, petal, × 4½; fig. 13, lateral sepals, × 4½; fig. 14, column, × 5½.—Drawn from the type.

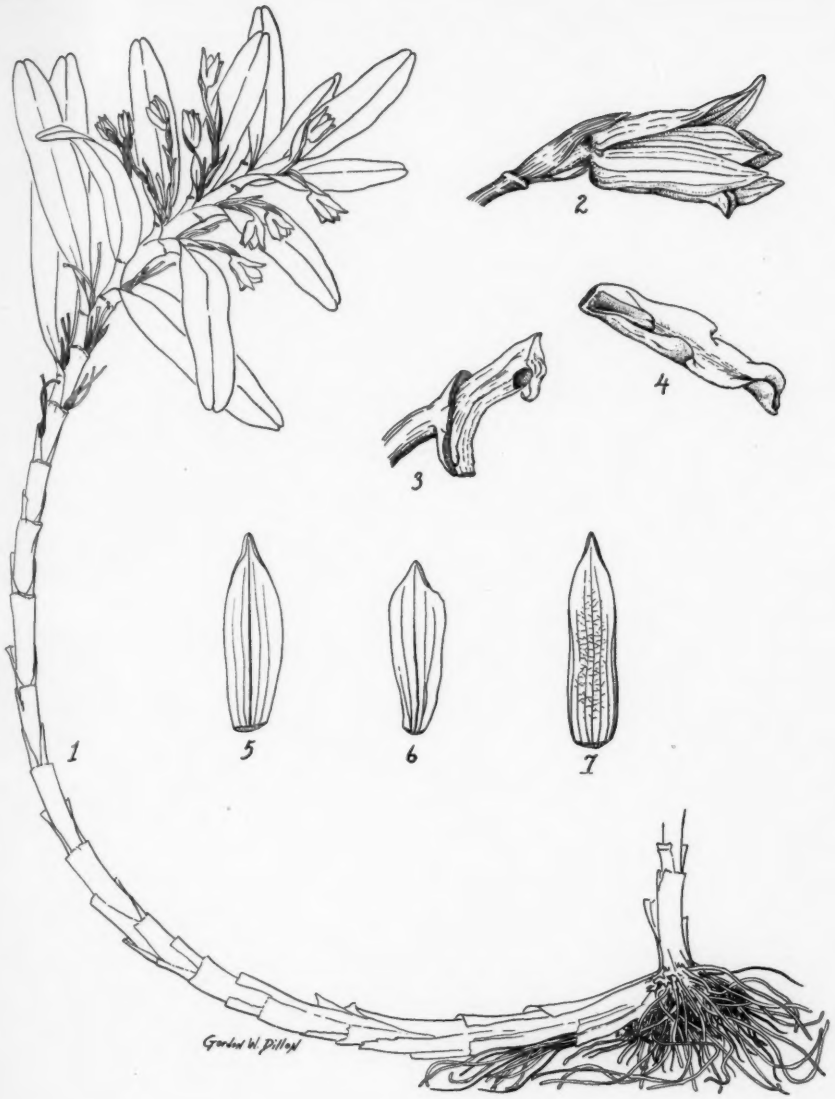



WOODSON AND SCHERY—FLORA OF PANAMA

## EXPLANATION OF PLATE

### PLATE 35

*Maxillaria Allenii:* fig. 1, plant, × ½; fig. 2, flower from the side, × 3; fig. 3, column and column-foot, × 5; fig. 4, lip, × 5; fig. 5, lateral sepal, × 3; fig. 6, petal, × 3; fig. 7, dorsal sepal, × 3.—Drawn from the type.




WOODSON AND SCHERY—FLORA OF PANAMA

## Explanation of Plate

### PLATE 36

*Sigmatostalix racemifera:* fig. 1, plant, × 1; fig. 2, flower opened out, × 5; fig. 3, lip expanded, × 5; fig. 4, lip and column from the side, enlarged; fig. 5, lateral sepals, × 5; fig. 6, dorsal sepal, × 5; fig. 7, petal, × 5.—Drawn from the type.


WOODSON AND SCHERY—FLORA OF PANAMA

# AN ATTEMPT TO RECORD INTERNAL TREE-TRUNK PRESSURES

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The terms "internal pressure," "root pressure," "exudating pressure," have become familiar to plant physiologists. Chase[1] gives an excellent historical review of the literature and no further citations will be made in this paper.

Most, if not all, workers dealing with gas pressures in plants have attempted to measure such forces by employing water- or mercury-filled manometers. Manual readings have been taken at irregular intervals, and very few automatic timing devices have been used or continuous records obtained. The writer recognized the need of a more elaborate investigation of internal pressures when engaged in a study of pruning paints and fungicides. Trunk cavities had been made in a manner acceptable to professional tree surgeons, but instead of being filled with concrete or some other material they had been covered with heavy plate glass cut to the correct size. Less elaborate ones had been made by drilling holes in the tree trunk and inserting the proper-size watch-glass. Without exception the glasses were either broken or were forcibly ejected from their anchorage in the matrix near the bark edge. An examination showed that they were literally "blown out"—usually within twenty-four hours after installation.

It was felt that pressure measurements would furnish the information needed to devise more substantial anchorages and covers more suitable than glass. Water-filled manometers were attached either to the trunk through a bored hole, or directly to the cavity through a vent tube. A record of the internal pressure—back of a glass-front cavity—as shown by a water-filled manometer follows:

[1] Chase, W. W. The composition, quantity, and physiological significance of gases in tree stems. Univ. Minn. Agr. Exp. Sta., Tech. Bull. 99:1-51. 1934.

| | |
|---|---|
| Sept. 24, 1932 | Partly cloudy |
| 5:00 P.M. | 17 mm. plus. |
| Sept. 25 | Cloudy |
| 11:00 A.M. | 5 mm. minus |
| Noon | 0 mm. |
| 1:00 P.M. | 0 mm. |
| 2:00 P.M. | 1 mm. plus |
| Sept. 27 | Cloudy—rain at noon |
| 9:30 A.M. | 4 mm. minus |
| 10:00 A.M. | 20 mm. minus |
| Sept. 28 | Clear |
| 11:00 A.M. | 12 mm. plus |
| Noon | 16 mm. plus |
| 3:00 P.M. | 18 mm. plus |
| 5:00 P.M. | 18 mm. plus |
| Sept. 29 | Clear |
| 10:30 A.M. | 12 mm. plus |
| 3:30 P.M. | 13 mm. plus |
| 5:00 P.M. | 13 mm. plus |
| Sept. 30 | Dull—some sun |
| Noon | 12 mm. plus |
| 1:00 P.M. | 11 mm. plus |
| 4:30 P.M. | 9 mm. plus |
| Oct. 1 | Clear |
| 11:30 A.M. | 14 mm. plus |
| Oct. 3 | Clear |
| 11:30 A.M. | 11 mm. plus |
| 2:00 P.M. | 13 mm. plus |
| 5:00 P.M. | 13 mm. plus |

The above record simply shows that on cool cloudy days no positive pressures are set up; on the contrary, minus pressures are obtained. On bright sunny days readings are as high as 18 mm. and on partly dull days the pressures are proportionally lower. The record also shows that manual readings, if not carefully taken at hourly intervals during the day and night, will not indicate the trend or rhythm of the phenomenon should they occur. Realizing the need for a continuous automatic record of internal pressure, the writer began to design and construct an instrument for the purpose. A water-filled manometer was fitted into a special case in which a self-recording thermograph had been installed. One arm of the manometer was connected to a bore hole in a tree by a length of rubber hose. The open arm supported a float resting on the water column which actuated a counterbalanced pen arm. The record of the internal pressure, along with the air temperature, was inscribed by the pen directly on the thermograph drum. When attaching the instrument to a sound tree trunk, a taper-threaded brass nipple was turned into a drilled hole 13 mm. in

diameter and about 140 mm. deep and usually within two meters of the ground line. If such a hole is drilled radially toward the center of the trunk, some parts of the sapwood will be sealed off by the nipple. In actual practice it is very difficult to determine exactly what layers have been tapped. In the course of several years some hundred or more manometers have been attached to trees—some in sapwood, some in heartwood and many tapped portions of each—and none have shown a characteristic difference.

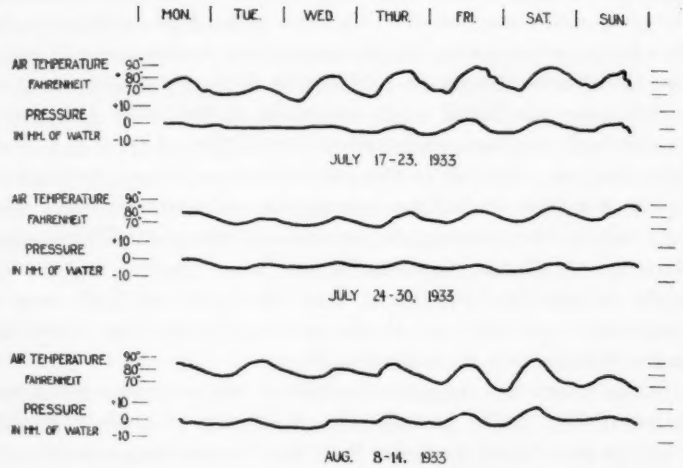



Fig. 1. Record of of internal pressure of *Quercus macrocarpa* for three typical weeks.

The graph (fig. 1) is from the record of three typical weeks, made while the instrument was attached to a Bur Oak (*Quercus macrocarpa.* Michx.). The threaded brass nipple connecting the instrument to the tree tapped both the sapwood and heartwood about one meter above the ground line. The instrument was in operation in this position for seventy weeks. The internal pressure is shown to be influenced only by changes in the volume of the confined air in the manometer and rubber tube connected with the bore hole in the tree trunk. Every fluctuation of the thermograph is duplicated by that of the

internal pressure pen. For most of the year, these two records traced on the one chart appear to have been made by two pens permanently linked together. The instrument was at all times protected from the sun by a small shed built around the trunk of the tree, and only the rubber tube projected from a dust-proof metal case. The instrument was not, however, compensated for temperature changes and is therefore subject to the same criticism as any other work in which manometers were used in a similar manner.

After seventy weeks the instrument was disconnected from the trees and "connected" to a mass of ordinary glazing putty. The brass nipple was simply imbedded in the mass of putty and the charts obtained could not be distinguished from those which were produced while attached to the tree. If the tree trunks had ever been under pressures different from those outside the tree, the lag in the establishment of equilibrium between a rising or falling barometric pressure and the pressure within the tree should have been recorded. The records show no lag for any season of the year. During stormy periods, barometric pressures may fluctuate one-half inch or more very quickly, yet there is no evidence that trees are under stress even during that time.

Since trees are apparently never under pressure it was believed that if the barometric conditions of stormy periods could be simulated, perhaps the "lag" in the re-establishment of equilibrium could be measured. It would be nearly impossible to place a mature tree in a chamber capable of pressure or vacuum, but it might be possible to place a tree trunk under pressure by pumping through a bore hole, or partially evacuating the trunk, regardless of atmospheric conditions. A rapidly falling barometer should leave a tree trunk under pressure; while a rising barometer should compress the gas within the bole.

A portable vacuum-pressure unit was constructed which could be used in the field on mature trees. As a compressor the pump was capable of maintaining a pressure of forty pounds per square inch and could handle approximately three cubic feet of air per minute as a vacuum pump. The power

source at first was a one-half horse-power air-cooled gasoline engine; later a six volt one-half H.P. electric motor driven by a storage battery. The suction line from the pump passed through two graduated gallon bottles; the second bottle was filled with water which passed over into the bottle nearest the pump. This served as a visual check on the pump performance and permitted a volumetric calculation of the air withdrawn from the tree trunk. In the field the unit was coupled to the tree through the same brass nipple used on the internal-pressure instrument, and water- or mercury-filled manometers were attached in the same manner.

Usually a manometer was placed about one meter below the point of evacuation and from four to six more were placed above this at intervals of one meter. When the pump was started and evacuation begun—at some point near the ground—the effect was almost immediately transmitted to the uppermost manometers. Mercury manometers of sufficient length to record the negative pressures obtained at various levels were not used because of the difficulty of installation and the care needed to avoid breakage. It was found, for instance, that the entire experiment had to be set up in a very short time—usually less than four hours—that bore holes became plugged if made too far in advance. Rarely, for the same reason, could the experiment be duplicated. Very short water-filled manometers were used and the air bubbles carried over furnished evidence of negative pressures within the tree trunk. Accurate timing in starting the pump and careful reading of the pressures became physically impossible—so rapid is the re-establishment of atmospheric pressure within a tree. For instance, after continued evacuation, about ninety seconds were required for the lowest manometer to show zero pressure in a Spanish Oak (*Quercus rubra* L.) seven meters high.

## SUMMARY

The need of a better instrument for recording internal pressures was recognized. An automatic instrument of the "dash-pot" type was constructed.

The records obtained, either from back of glass-fronted cavities or from bore holes in sound tree trunks, showed clearly that so-called "internal pressures" were due to temperature changes within the instrument.

When a mass of putty replaced the tree trunk identical records were obtained.

Internal pressures—if they exist—cannot be recorded with either manometers or the instrument described. The fluctuating barometric pressures of stormy periods were simulated by applying pressure or suction forces to a tree trunk. With the equipment in use, it was found that suction forces were more easily obtained. Positive pressures are more difficult to observe.

Equilibrium, following evacuation, is so quickly re-established that accurate measurements could not be taken.

It became physically impossible to read manometers placed one meter apart from top to bottom of a mature tree.

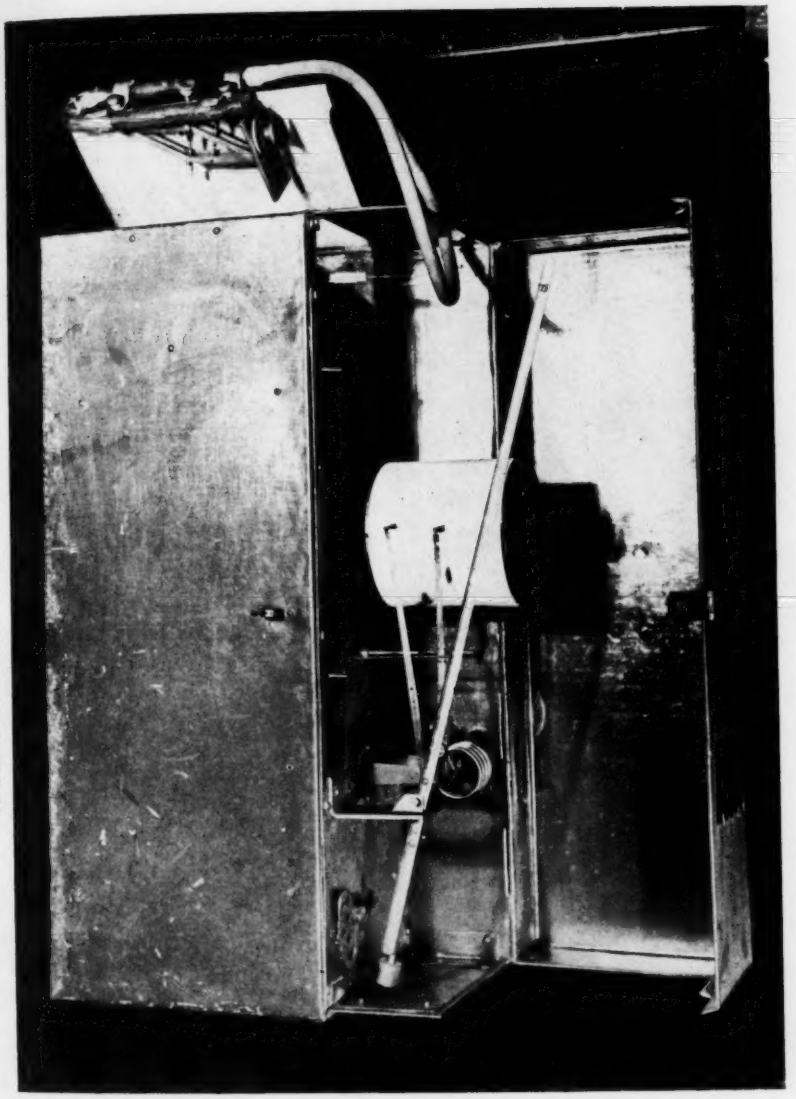
The "lag" in the establishment of equilibrium is shown to be about ninety seconds for a certain Spanish Oak.

From these experiments it appears that "internal pressure" differing from atmospheric pressure does not occur in normal sound trees.

## EXPLANATION OF PLATE

### PLATE 37

Instrument for recording internal tree-trunk pressures. See explanation in text.



BEILMANN—INTERNAL TREE-TRUNK PRESSURES